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TREATMENT OF LUNG ABSCESS

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THE mortality rate of surgically treated lung abscesses which hitherto ranged from 35 to 50 per cent^{2,3,4} has recently been substantially reduced^{4,5,6} by the introduction of early external drainage, improvements of methods of localization and operative technic. Although it is true that the prognosis from a statistical point of view has thus greatly been improved, in the individual case the indication for surgical intervention remains disputable. Tendency towards a conservative attitude is prompted by the fact that transpleural drainage, particularly by a two-stage method, is not without danger of complications. Furthermore, it is estimated that about 20 to 25 per cent^{7,8} of lung abscesses will eventually recede spontaneously if properly assisted by conservative management. The decision, therefore, whether surgical drainage is indicated hinges on two factors: first, the accuracy with which we can anticipate the future course of development, i.e., the likelihood of spontaneous cure; and, second, the safety of the technic with which the transpleural drainage is carried out.

Both problems will be discussed in the following report of 21 cases, most of which have been treated by a modified one-stage method, which will be described.

CONSERVATIVE TREATMENT

Medical treatment should be given an adequate trial since a certain number of spontaneous cures do occur. Besides general supportive measures, medical management consists of two main phases; an attempt first to disinfect the cavity; and, second, to establish or maintain bronchial drainage.

Chemotherapy is of limited value. Arsphenamines, specifically directed against spirochetes, have been disappointing and sulfona-

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mides have proved to be non-effective. Recent studies on sulfonamides and their "inhibitors" have shown that, irrespective of the type of micro-organisms encountered, these drugs are not efficacious. According to Lockwood¹⁰ sulfonamides interfere with the metabolism of bacteria by inhibiting their utilization of protein-split products. If, however, these are present in excess sulfonamides are rendered ineffective. Protein-split products are present in large amounts wherever polymorphonuclear leukocytes and tissue debris are present. They are found in excessive amounts in all closed abscess cavities, particularly those of the lung which so frequently are gangrenous in character. Hence, with the methods at our command we can not rely on chemotherapy to disinfect or sterilize the cavity.

Promotion of bronchial drainage is the only rational and effective conservative treatment. The liberal use of expectorants and fluids is indicated while prohibiting opiates and atropine. If free communication between the cavity and the bronchus exists proper posture of the patient is of importance, in order to empty the abscess cavity. Compression of lung tissue by artificial pneumothorax has been advocated but this procedure has not given satisfaction. Bronchoscopy, however, is often of great assistance and should be attempted in every case prior to external drainage. It should, however, be understood that bronchoscopy is needed primarily for diagnostic purposes. It is necessary to explore the bronchial system leading to the abscess cavity to rule out an obstruction accessible to local treatment, foreign bodies which can be completely removed, bronchial tumors which may be cauterized or which may warrant radical surgery. The diagnosis of a specific inflammatory process can be obtained by biopsy and lung mapping may be of assistance in arriving at a correct diagnosis. Adequate drainage may be initiated by bronchoscopic methods but caution should be applied since experience, including our own, has shown that bronchoscopic management may be followed by a stormy reaction, particularly after administration of too many opiates or too much cocaine.

HOW LONG SHOULD CONSERVATIVE TREATMENT BE MAINTAINED?

It is obvious that the danger of complications, i.e., secondary metastatic abscess, pleuritis, pneumopyothorax, hemorrhage, or pulmonary aspiration metastases, increases with the duration and progression of the gangrenous process. Furthermore, it has been shown⁶ that the prognosis depends to a large extent on the mode of progression of the original lesion. Every abscess is surrounded by a zone of pneumonitis. The cavity may enlarge by progressive gangrenous necrosis of its wall but may remain unilocular (simple abscess) or daughter abscesses may originate in the widened zone

of pneumonitis and may not be in continuity with the original abscess cavity (complicated abscess). Though it is evident that the chances of avoiding the development of a complicated abscess are better with early external drainage, it is unlikely that surgical interference is indicated as long as free bronchial drainage assures a fall of temperature and gradual decrease in the size of the cavity and infiltration.

In reviewing the literature it is difficult to obtain an accurate statement in regard to the criteria used to determine the proper time for surgical interference. With increasing experience and improvement of operative technic more emphasis is laid upon early external drainage until Overholt and Rumel⁶ concluded that "in general it should be carried out as soon as the diagnosis of lung abscess can be definitely established and localization can be agreed upon." This statement, though true in its principles, in my opinion warrants individual qualifications.

It is clear that surgical intervention should be carried out as soon as it is evident that bronchial drainage is unsatisfactory. There is no indication for surgical interference as long as conditions continue to improve. Further medical treatment should be abandoned

- (1) if the temperature remains elevated,
- (2) if x-ray examination shows progress of the lesion,
- (3) if cessation of the sputum without abatement of symptoms indicates the occlusion of a hitherto draining bronchus.

From the standpoint of rational treatment, transpleural drainage is indicated provided the abscess is near the pleural surface, provided it is possible to localize it accurately, and provided the surgical procedure does not add to the danger of complications.

SITE OF LUNG ABSCESES

By the time a lung abscess is clinically recognized, it can be stated safely that the majority of these lesions, irrespective of their mode of development, are situated very close to or at the pleural surface. If they are metastatic in origin they most commonly represent infected infarctions and, by the nature of this process, are situated beneath the pleura. The same holds true if they are bronchiogenic in origin. Either infectious material is aspirated into the peripherally located bronchiole or a larger bronchial branch is occluded by foreign material, resulting in peripheral atelectasis with subsequent bronchopneumonia and abscess formation. If the gangrenous cavitation is not primarily situated immediately next to the pleura, it will soon reach the surface by collapse of the thin overlying layer

of pulmonary parenchyma. This then participates in the suppurative and necrotizing process.

ROENTGENOGRAPHIC LOCALIZATION

We have several methods at our command to localize accurately an abscess cavity prior to operative drainage. In addition to con-

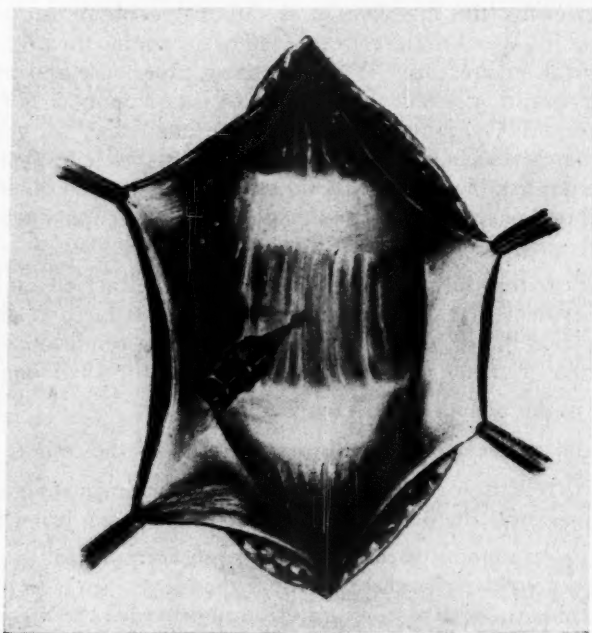


FIG. 1.—Illustrating the position of the needle previously inserted under the fluoroscope.

ventional roentgenograms, particularly in the presence of empyema, it may be advisable to use a planograph if this auxiliary instrument is available. Furthermore, a classification of the x-ray findings according to broncho-pulmonary segments as described by Glass⁹ has proved to be of great help in localizing the abscess cavity. A thorough examination under the fluoroscope, however, is indispensable to verify the findings.

SURGICAL DRAINAGE

Having thus localized the subpleural abscess, surgical drainage is instituted with a technic which assures complete sealing of the pleural cavity around an artificially produced fistula. It is obvious

that no difficulties are encountered if the adhesions of the two leaflets of the pleura overlying the cavity are already organized. As stated above, signs and symptoms indicating the occlusion of a previously draining bronchus, however, may necessitate immediate external drainage rather than waiting until fibrinous adhesions be-

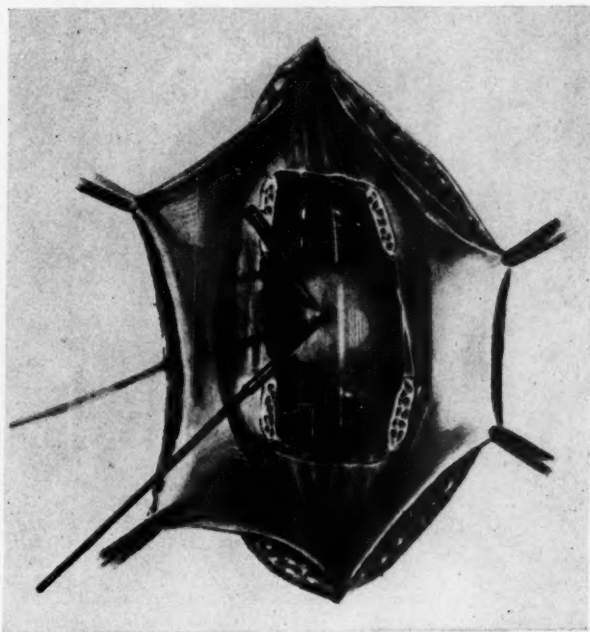


FIG. 2.—The smallest of Wangensteen's trocar is inserted into the abscess cavity. The light portion in the pleura is recognized as adherent thickened pleura.

come organized. It is now generally agreed that a one-stage method is preferable. I have used the following technic to advantage and believe that it possesses an extra margin of safety.

DESCRIPTION OF METHOD

Under the fluoroscope the abscess in its peripheral position is definitely located. At this site under local anesthesia the cavity is needled with a 22 gauge $2\frac{1}{2}$ inch needle. I have abandoned the use of skin markings and injection of dyes into the soft tissue since the mobility of these structures inhibit precise localization after the incision has been made. If the needle enters the free pleural space instead of penetrating the pleural adhesions into the abscess cavity, the needle can be withdrawn without danger and re-inserted at a different site.

It has been my experience that no untoward effects result from needling the pleural space. The operator will experience the sensation of relatively free motility of the plunger of the syringe as soon as the latter is in communication with the pleural cavity. In order to demonstrate objectively that the needle has entered the pleural

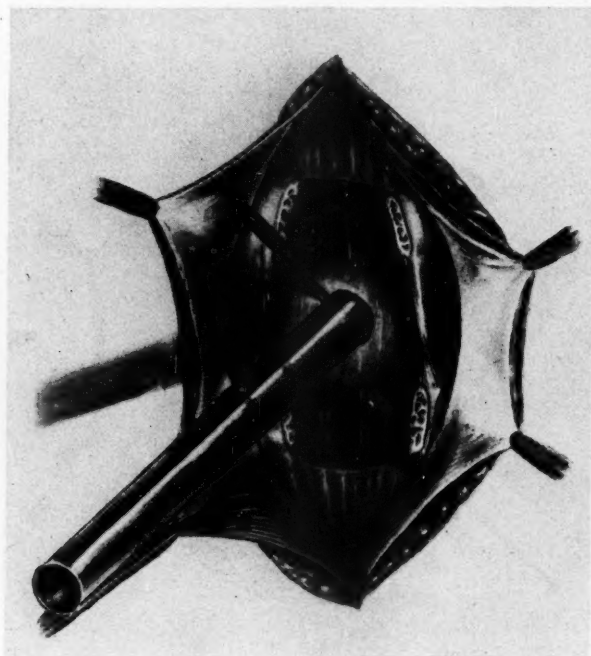


FIG. 3.—Large trocar is inserted and cauterized.

cavity manometric readings should be made. If an abscess cavity is entered gas and pus can easily be aspirated, in fact at times the plunger may be expelled spontaneously by the accumulated gas, which is usually of a characteristically foul odor. To aid further in the visualization of the cavity one or two cubic centimeters of methylene blue are injected. This serves later to aid in visualizing the abscess when one approaches the pleura. With the needle strapped in position the patient is then moved to the operating room where an incision at right angles to the ribs is made under local anesthesia. This type of incision in contrast to the customary horizontal one is preferred because in my experience the wound edges show less tendency to approach each other, thus preventing an untimely closure of the incision. Small segments of the rib above and below the needle

are excised. The intervening intercostal muscle segment is excised thus exposing the entrance of the needle into the pleura. If one finds the visceral pleura adherent at this site to the parietal leaflet, the needle may be withdrawn with impunity, but if there is any question about the adherence, the needle in situ is touched with coagulating diathermy. This securely seals the pleura. As an additional

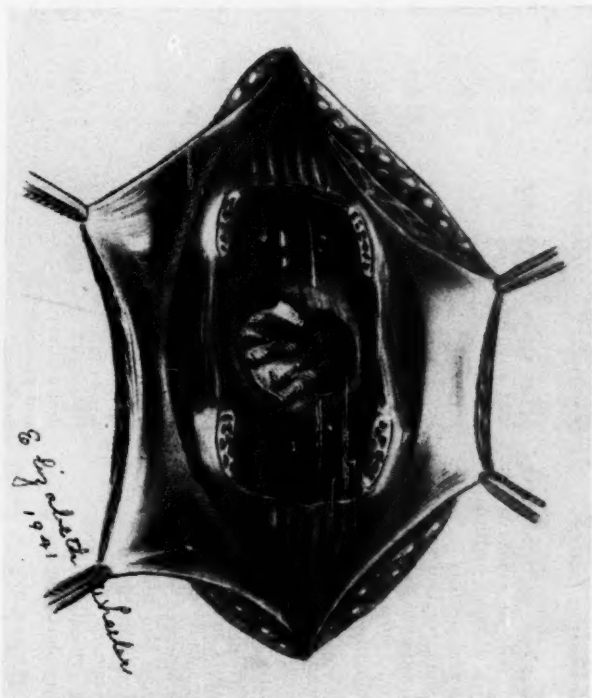


FIG. 5.—The opening is enlarged throughout its entire adherent field and packed with gauze soaked in zinc peroxide. No attempt is made to close the wound. It is packed with gauze.

measure of security, positive oxygen pressure is now introduced to press the lung firmly against the chest wall. Through the needle track the smallest gauged needle of Wangenstein's graduated abscess trocar¹³ set is inserted and the tissue cauterized. This procedure is repeated until the entrance is dilated to 1.5 to 2 cm. from which the opening can then safely be enlarged throughout its entire adherent field. The contents of the cavity are aspirated and the latter loosely packed with gauze saturated in zinc peroxide.

CASES	AGE	SEX	DURATION OF SYMPTOMS PRIOR TO OPERATION	INDICATION FOR OPERATION	LOCATION OF ABSCESS	TREATMENT	AVERAGE HOSPITAL STAY	RESULTS
L. S.	30	F	1 year	no improvement with conservative methods	rt. lower posterior	one-stage drainage	20 days	improved; later a lobectomy with complete cure.
W.S.T.	47	M	18 months	symptoms persisted after 18 mo. of conservatism with diabetes mellitus	upper right lobe anterior	two-stage	14 days	improved; bronchial fistula closed 4 mo. afterwards
I. J.	29	M	2 months	general debility	posterior, left lobe	one-stage	33 days	well
H.R.E.	42	M	4 months	productive foul sputum	rt. upper ant.	two-stage	25 days	well
M. M.	52	F	5 weeks	X-ray changes; temp. persisted	left lower, post. ax.	one-stage	30 days	well
R. B.	12	M	9 days	unimproved with sulfa drugs; other conservative measures ineffective	left upper post. axillary line	one-stage	26 days	well
D. W.	13	M	20 days	temp. elevation continued; X-ray changes; cough ceased to be productive	left lower lobe	one-stage	90 days	well
				paroxysmal attack coughing; chills and fever; unimproved with sulfa drugs and bronchoscopic; pyopneumothorax developed				
M.L.B.	32	F	3 weeks	pt. critically ill; symptoms progressing	left upper mid-axillary and rt. lower posterior	one-stage	11 days	massive hemorrhage; autopsy revealed eroded large artery in left upper lobe
M. T.	21	M	4 weeks	temperature persisted; X-ray changes noted; productive sputum	rt. lower lobe posterior	one-stage	35 days	upper lobe well
P. Mc.	12	M	4 months	X-ray changes; temp. elevation; symptoms	rt. upper lobe	one-stage	28 days	improved

P. Mc.	12	M	4 months	X-ray changes: temp. elevation; symptoms progressing	rt. upper lobe	one-stage	28 days	improved
P. Mc.	12	M	7 days	after extraction of tooth under gen. anest. pt. developed chills and fever; prior to this pt. was afebrile; removal of tooth was prep. for pt. discharge	rt. lower lobe	one-stage	60 days	improved; bronchial fistula
L. A.	15	M	8 months	persist. cough; foul breath; gen. debility	rt. lower post.	one-stage	85 days	bronchial fistula; pt. in school
C. H.	32	M	7 months	chronicity; foul breath; debility	rt. lower post.	one-stage	42 days	improved; bronchial fistula
L. P.	45	F	2 months	productive foul sputum; malaise with fever; unimproved bronchoscopic and supportive treatment	upper lobe, rt. posteriorly	one-stage	31 days	well
J. B. L.	33	M	4 months	wt. loss; temp. remained elevated	rt. lower ant. axillary	one-stage	48 days	well
B. M.	33	M	12 months	foul cough; malaise and invalidism	rt. upper lobe post. beneath scapula	one-stage	46 days	well
E. V. D.	27	F	6 weeks	temp. elev. and X-ray changes; pyopneumothorax result from abscess rupture	left lower post.	one-stage	26 days	well
O. H.	30	F	7 months	cough; malaise; acutely ill	rt. lobe post.	one-stage	47 days	improved; bronchial fistula
G. H.	48	F	3 months	repeated hemorrhage; foul sputum	left upper ant. axillary line	one-stage	17 days	well
C. I. F.	11	F	4 weeks	pt. unimproved under conserv. treatment; temp. elev. persisted; localized empyema continued malaise, chills and fever	rt. upper lobe anterior	one-stage	31 days	well
O. F. T.	41	M	6 weeks	unimproved after conservative management	left upper lobe posterior	one-stage	12 days	well

TABULATED REPORT

Twenty-one cases are reported, 13 males and 8 females, whose ages range from 11 to 52 years. The duration of illness prior to surgical intervention ranges from 9 days to 540 days. Stay in the hospital varied from 11 days to 90 days. Nineteen were treated by one-stage procedure. Two developed tension pyopneumothorax and were treated by the Dolley and Jones¹¹ method. There was only one death; a patient with multiple lung abscesses expired from gross hemorrhage of an eroded pulmonary artery 11 days postoperatively. The remaining patients, after 3 months to 3 years, have returned to their former activities.

SUMMARY

1. Twenty-one consecutive cases of lung abscesses are reported treated by external drainage, nineteen of them by a one-stage method.
2. Indication for surgical interference is discussed. It is concluded that external drainage should be instituted as soon as it becomes evident that bronchial drainage is insufficient.
3. Surgical intervention is indicated if
 - a. There is continued elevation of temperature without symptomatic improvement.
 - b. X-ray examination shows progression of the lesion.
 - c. There is cessation of the sputum without abatement of the symptoms.
4. The mortality rate of this series is only 4.75 per cent although from nine to more than 540 days elapsed between the establishment of the diagnosis of lung abscess and institution of external drainage.

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POSTOPERATIVE THROMBOPHLEBITIS

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IT IS almost impossible to discuss intravascular clotting, thrombosis, or thrombophlebitis, without including the tragic and often fatal sequela, embolism.

Thrombosis occurs in medical as well as in surgical patients. I believe it is safe to say that, roughly, 40 per cent of cases are medical (patients with cardiac disease, typhoid fever, influenza, pneumonia), and that 60 per cent are surgical. In surgical cases, thrombosis follows laparotomies in 81 per cent, extra-abdominal operations in 19 per cent, hernias, breast operations, thoracotomies, cranial operations, subphrenic abscess, fractured hip, thyroidectomy.

In many cases there is no evidence of thrombus until embolism has occurred. It is estimated that for every fatal case of embolism 2 or 3 non-fatal cases occur. It follows 0.1 to 0.2 per cent of all operations, causes 2 per cent of all deaths, 6 to 8 per cent of all postoperative deaths, and is found as the cause of death in 10 per cent of all autopsies. Barnes estimates that annually 33,748 deaths in the United States are caused by embolus. If this represents two thirds of the instances of embolus, then 51,000 patients have embolus. If 50 per cent of the patients with thrombosis have embolus, then it is safe to say that at least 100,000 instances of thrombosis occur annually in this country. This large number demands attention as to cause, prevention and treatment. With the idea of interesting you in this increasingly important subject, I wish to present its postoperative aspect.

The location of the thrombus, in the order of frequency, is femoro-iliac, calves, pelvic and prostatic plexuses, vena cava, auricle. *Phlegmasia alba dolens*, the familiar picture, is the most frequent. Here, the passing of the vessel beneath the inguinal ligament, the entering at right angles of the superficial veins, the nearness of the internal iliac, the right-angled junction of the common iliacs, and the overlying hypogastric artery,—all conduce to slowing the stream.

Hunter, Sneed, Robertson and Snyder removed the gastrocnemius and soleus muscles from 351 bodies collected from four hospitals: 209 pairs of muscles were studied. They found thrombi in 52.7 per cent of 351 patients. The veins in the soleus accompanying the lower arteries were occluded twice as frequently as in the gastrocnemius. Firmness of the thrombus varied with the time the

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patient was confined to bed. Fatal and non-fatal emboli were found in 14.55 per cent. Hunter and his colleagues therefore think that when thrombosis occurs there is a strong probability that the deep vessels of the leg will be the sites.

Neumann thinks that thrombus is primary in the small veins of the foot and the leg. Belt, Roessle, Homans, Conner and others hold the same view.

Though Homans uses the term thrombophlebitis to indicate only the site of the clot, Ochsner thinks there is a distinction between thrombophlebitis, suggesting an inflammatory process, and thrombosis, thought to occur most frequently in the lower leg, the result of mechanical factors. From these (mechanical) thrombi, most emboli are said to arise, for attachment of the clot to the vessel wall is not so firm as it is in the groin.

Homans believes that most thrombi occur in the absence of any known influence. There are, however, certain patients who seem prone to develop this complication. The patient over 40, obese, hypothyroid, having foci of infection, whose blood pressure is low, or who, in active life, is suddenly confined to bed,—this patient is most likely to suffer thrombosis. Bancroft has demonstrated that 12 to 14 per cent of these patients have a high clotting time. It is among these, he thinks, that thrombosis is most frequent. Dr. William H. Welch, in his classic, *Thrombosis*, in Albutt's *System of Medicine*, 1898, stated that there is a sudden increase in platelets just before thrombosis occurs. Bancroft, however, after a platelet count and platelet dissociation study in 1600 patients with and without phlebitis, was unable to detect any change in the platelets indicative of a pathologic process.

In abdomino-perineal operations, in those on the bladder, the prostate, the female pelvic organs, the pancreas, on the bile passages, on the ruptured appendix, those for cancer of the stomach, and in splenectomies, thrombosis is not unusual. Trousseau, in 1865, showed its frequent association with cancer, especially of the stomach. In pelvic operations, blunt, rather than sharp, dissection is frequent. Here injury to the vessel walls is common—an important factor in thrombus formation.

One author, in explaining thrombosis in the calves, says the patient's legs are made too comfortable: motion is discouraged. He shows that the veins accompanying the deep arteries are compressed. Now the intima is nourished from the blood stream. If the walls are in contact, nutrition is impaired, and clotting promoted by the arrest of platelets in a coral-like manner. In this mesh, white blood cells are caught—the white clot. To it are added red cells, extending the

thrombus toward the heart. This part is not fixed to the vessel wall and is easily whipped off to become an embolus. Frykholm, of Sweden, has shown this condition graphically.

Factors that influence clotting are: (1) the condition of the vessel wall, (2) the state of the blood, and (3) slowing of the current. Nearly all authors are in agreement on these factors. Injury to the vein, infection and continuous intravenous therapy lower the resistance of the vessel wall. Patients on the operating table lose fluid by sweating, vomiting and bleeding: dehydration, loss of sodium chloride, and increased viscosity of the blood result. Smith and Allen showed that the rate of flow is reduced as much as 40 per cent postoperatively. Limited excursions of the diaphragm fail to draw blood to the heart. Vomiting, distention, tight dressings, the position in bed, all tend to slow the venous current. The thighs bent at the hip, the legs bent at the knee are additional factors. Homans pertinently remarks that the Gatch bed should be used to prevent, rather than to induce, thrombosis.

Since the onset of thrombosis is in the first two or three days after operation, whatever is done to prevent it must be done immediately after, or even before, operation.

Preventive measures are important, especially in patients liable to thrombosis. Deep breathing creates a negative pressure in the chest, drawing blood to the heart. If this cannot be done, coughing is induced, or inhalations of oxygen at 2 hour intervals for the first 24 hours are given. The importance of diaphragmatic breathing is easily demonstrated in animals whose phrenic nerves have been cut: The blood current is slowed. Not stagnant, but slowly moving blood is the blood that clots. We can do much to reduce the incidence of intravascular clotting. A high carbohydrate diet, with intravenous sodium thiosulphate, will lower a high clotting index. Dehydration must be prevented by administering blood, plasma, glucose, salt solution intravenously or subcutaneously, salt solution rectally, and other fluids orally. Postoperative cases suffer from too little rather than from too much fluid. Vomiting, distention, tight dressings must be eliminated. Distention may be avoided by earlier feeding: the empty, not the food-containing, gut distends.

The position of the patient is important: it is better for him to lie flat with the foot of the bed raised from 6 to 12 inches—if not continuously, then for a few hours at a time—for the first 24 to 48 hours.

Some clinics have the legs massaged immediately after operation. Poole, of New York, as early as 1913, urged patients to move their legs after operation. Gamble, of Mississippi, has his patients pedal,

beginning the second day after operation. He also gives intravenous fluids on the operating table. Frykholm feels that lowering the foot of the bed distends the veins of the calf: the patient must push against the foot of the bed to avoid sliding down. These alternating contractions and relaxations of the leg muscles keep the blood in active motion.

Thyroid extract increases the pulse rate.

Avoid injury to the fat abdominal wall.

Many patients, especially elderly ones, should be got out of bed sooner.

When definite measures have been taken to prevent postoperative thrombosis, the results have shown a remarkable decrease. The Mayo Clinic, Bancroft, de Takats, Homans, Ochsner, and many others have found that these methods, in contrast with controlled series of cases, reduce thrombosis almost to the vanishing point. Homans related that his urologic confrere reduced it to almost nothing in his prostate cases by the simple expedient of elevating the foot of the bed.

Heat over the abdomen and legs, beneath a cradle, greatly improves the circulation: Ochsner attributes the low incidence in his cases to this routine.

In an analysis of the postoperative deaths over a twenty year period in Dr. Hugh Young's clinic, Culp found 88 deaths from pulmonary embolism. He thinks that several patients, with unrecognized thrombosis were operated on, the clot becoming free during or after operation. On the suggestion of Rich, a pathologist, that the circumference of the legs be measured to determine whether differences not apparent to inspection were present, these measurements revealed 9 cases of thrombosis in 269 patients. It is now their practice to measure the legs of their patients from the groin to the malleoli at intervals of 10 cm. They do this on admission, before and after operation and before letting the patient out of bed.

Frequent palpation of the toes, soles, calves and thighs will reveal tenderness of thrombosis is present. Homans' sign, pain in the upper calf on forcible dorsal flexion of the foot, is pathognomonic in many cases.

The use of purified heparin by Murray and Best of Toronto to maintain a coagulation time of 15 minutes has given encouraging results. To quote from Dr. William H. Howell: "Murray states that in the Toronto General Hospital, 10 per cent of postoperative deaths were due to pulmonary embolism: and that an additional 10 per cent had symptoms referable to pulmonary embolism, which constituted probably a factor in the fatal termination. In this hos-

pital, heparin has been given by the method of continuous injection in some 400 cases. In none of them was there any evidence of thrombosis or pulmonary embolism, although the cases selected for treatment included chiefly those involving operations in which experience has shown that thrombosis occurs with some frequency." If these results are confirmed, heparin will have an important place in this field.

In addition to abundant fluids, I have used pedalling, deep breathing, and have the patients lie flat for several days. Within the last 18 months, in 7 cases where these methods were not used, thrombosis occurred.

If a thrombus forms, rest, heat, and elevation of the leg are advised. Nearly always there is an associated vasospasm with pain. Paravertebral injections of novocain (Leriche's method, made popular by Ochsner), repeated daily until the fever subsides, have given marked relief. Papaverine rather than morphine is advocated by de Takats for pain.

Intravenous papaverine, inhalations of oxygen, and heparin intravenously can be given. Heparin will not dissolve a clot. It acts by neutralizing thrombin, or by preventing the conversion of prothrombin to thrombin. In transfusions, heparin instead of citrate can be used for these patients. Embolectomy following heparin has been more successful than previously.

If the clotting index is high, sodium thiosulphate should be given. It is non-toxic, even in large doses.

If a thrombus forms, it begins within the first few postoperative days. Therefore use prevention immediately after, or even before, operation.

If thrombosis can be prevented, whatever the means used, we shall have made a great step forward.

In summary: Thrombosis after operations is too frequent. Records prove that it can be prevented.

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BROAD LIGAMENT VARICOSITIES

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DUDLEY³ in 1888 identified broad ligament varicosities as a clinical and pathologic entity, and made an analogy between them and the varicocele of the male. The discomfort caused by the varicocele in the male is accepted without question; varicosities in the female are overlooked because:

1. Varicose veins of the female pelvis are not looked for.
2. Most pelvic operations are done in the Trendelenburg position, which allows a rapid drainage of the distended veins.
3. Many times the ovarian cyst caused by prolonged pelvic congestion causes us to overlook the cause for result.
4. Profound knowledge of female pelvic anatomy and pathology is found wanting. A more detailed study of them is essential to a better understanding of the physiology, pathology and treatment of pelvic disturbances.

Pelvic veins are without valves which predisposes them to overdistention, and makes their several points of support insecure. The pelvic veins are particularly applicable to quadrupeds and not to bipeds.

Overdistention of these pelvic veins results in pelvic congestion, producing a burning, dull, bearing-down sensation in the back, or posterior surfaces of the thighs, and may radiate to the lumbar region. They are also associated with vaginal discharge, menstrual irregularities, dysmenorrhea, and ovarian cystic changes.

There are at least two types:

1. Temporary dilatations of a static type as in pregnancy, when properly cared for respond to non-surgical treatment.
2. The permanent type is a chronic condition and constitutes a surgical entity because of definite anatomic changes present in the vessel walls. These result from:
 1. Anatomic structure, placement and support of vessels involved.
 2. Absence of valves in veins.
 3. Constipation and pressure from heavy sigmoid from stasis.
 4. Tight lacing and relaxed pelvic outlet.
 5. Relaxation of pelvic tissue from pelvic injury (child-bearing).
 6. Ptosis of debilitated states (exhaustion, anxiety neurosis?).
 7. Large ovarian tumors or fibroids.

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8. Unhealthy venous walls from infections.
9. Uterine displacements with or without relaxed pelvic outlets.
10. Pregnancy and abortions with frequent sub-involution.
11. Sub-involution and too early activity after delivery.
12. Chronic endocervicitis and endometritis.
13. Excessive coitus and chronic pelvic congestion.
14. Cirrhosis of liver, portal obstructions and cardiovascular decompensation.

One asks how often do such cases occur? In the Gynecological Department of the Louisville City Hospital from January, 1933 to January, 1938, there were:

- 1889 major gynecologic operations,
- 670 hysterectomies for fibroids,
- 336 hysterectomies for uterine disease, prolapse and other uterine pathology,
- 129 perineorrhaphies and suspension for uncomplicated relaxations and retroversions.

From a study of these groups, it is estimated that 80 per cent of uterine fibroids, at least 75 per cent of cases of retroversions and prolapse uteri, and about 50 per cent of ovarian cysts, and 20 per cent of chronic pelvic infections from any source have varicosities of the broad ligaments.

BROAD LIGAMENT VARICOSITIES—GROUP I

Hysterectomies 43 Cases	Average Age 33 Years	Average Menstrual Duration 8.3 Days Average of 3.2 Children
SYMPTOMS		FINDINGS
Pains Lower Abdomen and Left Side:	93%	Relaxed Vaginal Outlets: 67%
Vaginal Discharge:	72%	Chronic Endocervicitis: 65%
Backache:	53%	Retroverted Uteri: 58%
Pains on Right Side Also:	28%	Tenderness Left Lower Quadrant: 53%
Pains Worse on Standing:	20%	Tenderness Both Quadrants: 46%
		Average Hemoglobin: 72.2%
OPERATIONS		RESULTS
Hysterectomy:	100%	Excellent: 24%
Supravaginal Hysterectomy:	63%	Satisfactory: 56%
Perineorrhaphy:	72%	Complaints: 20%
Incidental Appendectomy:	58%	
Cauterization of Cervix:	46%	
Unilateral Oophorectomy:	12%	

BROAD LIGAMENT VARICOSITIES—GROUP II

Uterine Fibroids 30 Cases		Average Age 37.8 Years	Average Menstrual Duration 5.9 Days Average of 2.1 Children	
SYMPTOMS			FINDINGS	
Feeling of Abdominal Weight:		76%	Relaxed Vaginal Outlet:	54%
Backache:		66%	Chronic Endocervicitis:	39%
Urinary Disturbances:		65%	Tenderness Left Lower Quadrant:	32%
Vaginal Discharge:		63%	Tenderness Right Lower Quadrant:	26%
Lower Abdominal Pain:		56%	Average Hemoglobin:	72.5%
Vaginal Bleeding:		50%		
OPERATIONS			RESULTS	
Supravaginal Hysterectomy:		80%	Excellent:	89%
Total Hysterectomy:		20%	Satisfactory:	9%
Incidental Appendectomy:		60%	Complaints:	2%
Perineorrhaphy:		27%		
Unilateral Oophorectomy:		8%		

BROAD LIGAMENT VARICOSITIES—GROUP III

Suspensions 39 Cases		Average Age 32.5 Years	Average Menstrual Duration 5 Plus Days Average of 2.6 Children	
SYMPTOMS			FINDINGS	
Pain Lower Abdomen and Left Side:		59%	Retroverted Uteri:	70%
Vaginal Discharge:		59%	Chronic Endocervicitis:	59%
Urinary Disturbances:		59%	Tenderness Left Lower Quadrant:	63%
Backache:		54%	Tenderness Both Lower Quadrants:	42%
Pain in Right Side Also:		41%	Relaxed Outlet with Cystocele and Rectocele:	56%
			Average Hemoglobin:	72.3%
OPERATIONS			RESULTS	
Suspension Operations:		100%	Excellent:	36%
Perineorrhaphy:		76%	Satisfactory:	52%
Incidental Appendectomy:		70%	Complaints:	12%
Cauterization of Cervix:		52%		
Unilateral Oophorectomy:		18%		

After eliminating all complications of infections, ovarian cysts, and all cases in which the findings of broad ligament varicosities were not recorded preoperatively, we found 112 cases of uncomplicated broad ligament varicosities recorded by twelve operators. These cases were divided into the following groups:

Group I: 43 cases of hysterectomy for fibroids of uterus, endo and myomectomies, fixed retroversions uncomplicated by other lesions.

Group II: 30 cases of hysterectomy for fibroids uncomplicated by other pelvic lesions.



FIG. 1—Photomicrograph of vein in broad ligament. Magnification 16 diameters. The vein is tortuous and thick walled. About the vessel and near the surface the tissue is made dense by old scarring.

Group III: 39 cases of suspension for relaxed vaginal outlets with retroverted uterus.

Group III constitutes 30 per cent of all the suspensions done in the past five years. This is a meager indication as to the frequency of pelvic varicosities.

The predominating findings in these groups were a majority of married women who had a prolongation of menstrual periods, clots and discharge. Symptoms were: pain and tenderness in lower abdomen, 70 per cent, associated with vaginal discharge and backaches, urinary disturbances, all of which denote pelvic congestion from any source.

The physical findings were: tenderness in lower abdominal quadrants, relaxed vaginal outlet with retroverted uteri in 56 per cent of cases, with chronic endocervicitis as the outstanding disturbances noted.

The blood picture was one of secondary anaemia, an average hemoglobin of 72.2 per cent (Sahli).

The percentages of perineorrhaphy ranged from 27 per cent in fibroids to 72 per cent in hysterectomy for fibrosis, which revealed the necessity of proper pelvic support. This indication in many in-

stances is overlooked by the general surgeon, but is most important for a satisfactory termination of such cases.

In the combined groups there were satisfactory results in 86.0 per cent of cases.



FIG. 2.—Photomicrograph of vein in broad ligament. Magnification 120 diameters. The intima is markedly thickened by old hyalinized connective tissue, the muscle is hypertrophic and about the vessel there is dense connective tissue also.

We can not fail to be struck by the similarity in the symptoms of the above groups, known to be present and associated with broad ligament varicosities, and the symptoms associated with a classical case of broad ligament varicosities. We also believe that a great percentage of these symptoms were the result of the pelvic congestion from the varices.

The diagnosis in this series were made from the operative findings, but a diagnosis can be made before operation in the following way:

1. By exclusion of inflammatory masses, pregnancy and other causes of pelvic congestion.
2. Absence of inflammatory adnexal masses.
3. Normal white blood counts.
4. Uterosalphingograms show patent, undisturbed tubes and no evidence of infection; 56 per cent of cases were retroverted.
5. Boggy, disappearing tender mass lateral to the uterus. Mass is larger and more tender when patient is on her feet.
6. Normal sedimentation rate.
7. More commonly found in exhausted, undernourished women.

It is not to be inferred that varicosities are the cause of fibroids, but we do believe that a large percentage of pelvic symptoms associated with the uncomplicated fibroids are the result of an abnormal

congestion produced by prolonged engorged, incompetent veins. We are of the belief that the prolonged congestion produced by the

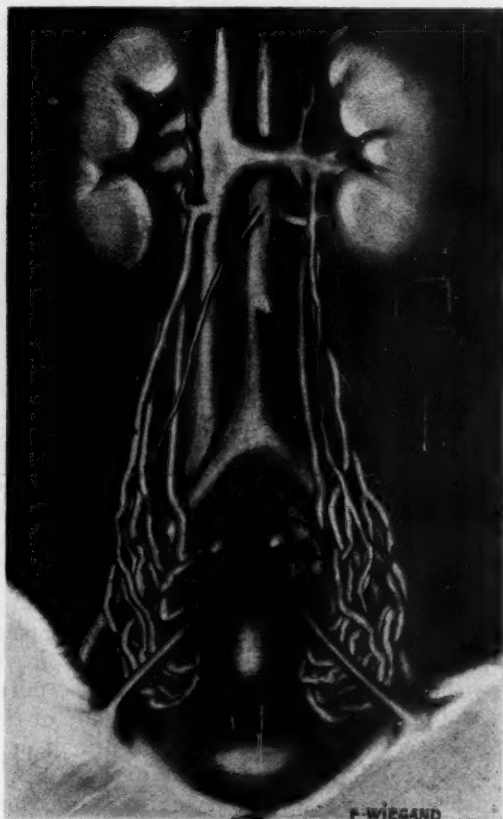


FIG. 3.—Broad ligament varicosities.

varicose veins is a great factor in the production of retention cysts of the ovaries, and later fibrosis of uteri and ovaries with their associated symptoms and sterility.

Broad ligament varicosities may result from a number of causative factors, or conditions which produce prolonged pelvic congestion resulting in incompetency of the veins. The satisfactory treatment, therefore, must be dependent upon the correction, when possible, of the causative factors. The pelvic congestion, when present, produces progressive pathologic changes regardless of the causative factors, whether they be malpositions, fibroids, or cysts.

In cases of uterine fibroids, supravaginal hysterectomy removes the cause of pelvic congestion, and one must keep in mind that 30

per cent of these cases are associated with relaxed vaginal outlets, and if not corrected, the pelvic congestion and symptoms will recur.

In cases of uterine fibrosis, chronic endometritis and other uterine lesions, after the age of 35, these are the most pathetic type of

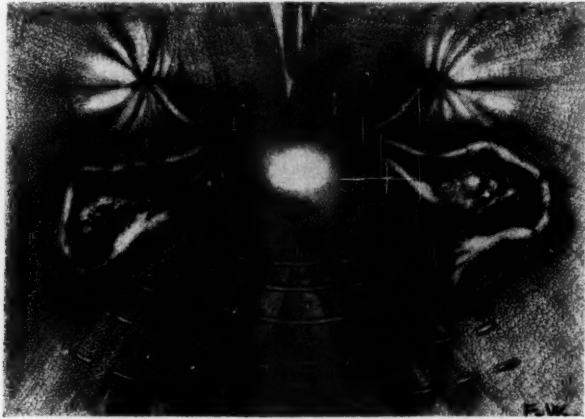


FIG. 7.—Sutures in intersacral ligaments: Imbrication of posterior sheath of broad ligaments.

prematurely-aged individuals we have to deal with, and we usually wish to refrain from radical operative procedures because of the fear of possible resulting invalidism. The pelvis in these cases presents a grayish, mottled, retroverted uterus; the capillaries of the pelvic organs and peritoneum are dilated; the body of the uterus is usually enlarged, irregular and softer than normal, or it may be small and fibrosed; the ligaments are very loose and the tubes are congested, ovaries contain cysts of varying size, and fibrosis of the capsule of the ovaries. The broad ligaments in these cases show generalized bilateral enlargement of both the ovarian and uterine veins, (usually more marked on the left). The marked enlargement of the veins about the uterine arteries, in such cases, we think, is more responsible for backache than are the congested ovarian veins. It is useless, we believe, to expect suspension operations alone to bring about satisfactory results where permanent changes are present, therefore, we advocate supravaginal, total or vaginal hysterectomies in the properly selected cases of this group as the best means of obtaining permanent results.

Prophylaxis and prevention is the key-note in the present day treatment of any condition. Proper attention to details after pregnancy, and careful follow-up with correction of all conditions until patient has returned to normal health, proper spacing of children,

careful prenatal care and with modern obstetrics the repair of all perineal lacerations at the time of delivery is a great step in the prevention of catastrophies. Careful treatment of sub-involution and all post-partum, and especially post-abortion infections is of greatest importance. Neglect is in many instances a cause of these varicosi-

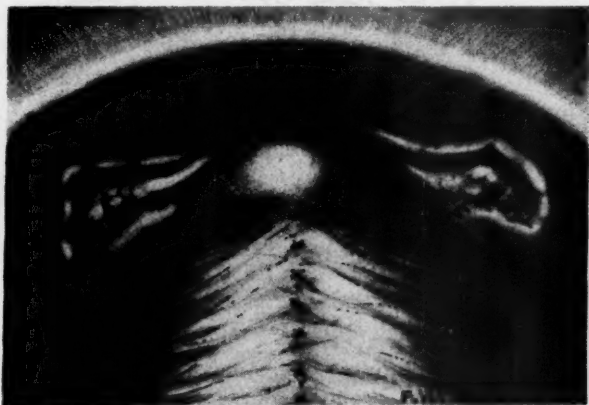


FIG. 8.—Results of imbrication of posterior sheath of broad ligaments.

ties. Young mothers are so intent on their social and financial responsibilities that they tend to return too soon to normal activities and neglect the correction of post-partum complications, thereby incurring conditions which prove detrimental to their future health.

In the young mother, early evaluation of broad ligament varicosities is of paramount importance to prevent sequelae. In such cases, the proper use of pessaries and general supportive measures are important. Only by careful scrutiny can we differentiate between cause and effect, and by early correction of causative factors can we prevent the effect of varicosities on the pelvis and the individual.

Many a chronically congested tube has been removed for salpingitis, with the relief of the symptoms produced by correcting the varicosities, when salpingitis was not present, the woman was unnecessarily sterilized, and the cause was overlooked. We think that some cases of pelvic congestion from varicosities have been incorrectly interpreted as endocrine dysfunctions.

When a case of varicosities of the broad ligaments does develop in young, child-bearing mothers, and can not be corrected by conservative measures, we feel that operative correction is essential for satisfactory results and the prevention of a long train of sequelae. In these uncomplicated cases of varicosities of the broad ligament

in the young, child-bearing woman, we utilize the following modification of the Emge suspension operation:

In addition to suturing of the uterosacral ligaments we advocate a broader imbrication of the posterior sheath of the broad ligaments so as to produce a seat-like effect, as a uterine support, we

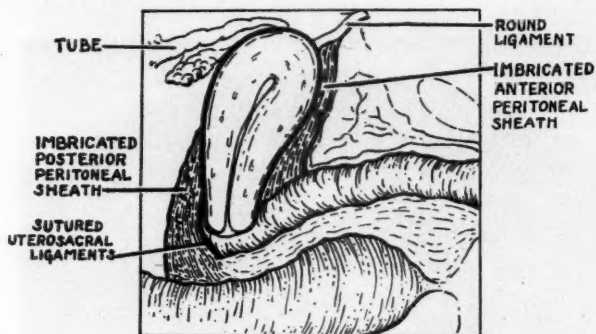


Fig. 9.

combine the above procedure with a modified Gilliam, or Coffey type of suspension of the round ligaments and imbrication of the anterior sheath of the broad ligaments. We feel that it is of equal importance to build up the perineal floor when necessary to insure a proper support. All sutures in these cases are of silk or unabsorbable material to insure permanency. This not only makes a secure anterior suspension of the uterus, which prevents descensus and congestion, but gives an anterior and posterior support of the pelvic veins which assists in better drainage (fig. 9). We do not feel this is curative, but it does serve as a supportive structure to the dilated veins, which aids in drainage and thereby gives relief from symptoms of over-congestion. The above does not prevent future normal pregnancies.

Following the hospital convalescence, general upbuilding regime, knee-chest position, daily hot douches for thirty minutes, for a period of weeks are of paramount importance in assisting Nature's return to normal.

With a more careful study of such cases, cause and effect, and the selection of an operative procedure best suited to the case, most satisfactory results can be expected.

CONCLUSIONS

1. Presentation and analysis of 112 uncomplicated cases of fibroids, uterine prolapse and retroversion and other non-inflammatory lesions in which the operative notes recorded: *Broad Ligament Varicosities*, showing the relative percentage of incidence of varices.

2. The proper treatment of varicosities is dependent upon the condition with which they are associated.

3. A good perineal floor is of paramount importance in prevention of pelvic congestion and varicosities.

4. Prophylaxis and earlier recognition of predisposing factors to the formation of broad ligament varicosities and pelvic congestion will prevent many cases of debilitation in women and reduce unnecessary major operative procedures.

5. Further studies, cause and effect, are necessary in this very common condition, which heretofore has been overlooked.

6. Presentation of an operative procedure used in the simple, uncomplicated cases.

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THORACOPLASTY IN THE TREATMENT OF PULMONARY TUBERCULOSIS

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IN this paper will be given some observations and findings in the cases of pulmonary tuberculosis at the Georgia State Tuberculosis Sanatorium, who have undergone thoracoplasty during the past several years.

The first rib removal operation as a treatment for tuberculosis at the Sanatorium was done in 1934. The number has gradually continued to increase since that time and, at present, it is believed to offer the best chance for recovery to a very considerable number of the patients at the institution.

During the early years of our experience, the immediate and remote results were so discouraging that thoracoplasty was recommended to but few and then only with considerable doubt and hesitation, even when the indications for the operation were apparently clearly present. The results in our first patients were poor despite the fact that they were selected with great care. None was operated on unless the general condition was excellent, and the contralateral lung unquestionably good. Almost all had a stormy post-operative experience. Severe surgical shock and alarming dyspnea—as a result of severe cardiorespiratory failure—were almost invariably present. Too often the cavity was not closed and the patient was not only not improved but worse than before he had the operation.

It is not the purpose of this paper to discuss the generally accepted indications, contraindications, surgical technic or the very important preoperative and postoperative management of these patients, but I do wish to mention some of the factors which we believe have improved our results.

Most of our early poor results were not due to the selection of unsuitable candidates for the operation, but rather to failure to recognize the smaller and then apparently not so essential factors which now are regarded with the utmost respect.

Another serious error was the usual one of resecting portions of too many ribs at one operative stage, and also in removing insufficient lengths of ribs and transverse processes to obtain closure of the cavity. It is our present practice to remove two, or at the most,

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three ribs at the first operation, and never more than the equivalent of long sections of two ribs at any subsequent stage.

It is now known that if it is at all possible, some exercise for at least a week or two previous to the operation greatly reduces the frequency of some of the more serious complications. The cardio-respiratory and vasomotor functions of a patient who has been in bed for some time and who is also suffering from the ill effects of tuberculin toxemia are definitely impaired. If such a patient can be given 15 to 30 minutes walking daily his chances are materially improved. If any degree of dyspnea is present after a moderate amount of exercise, it certainly means that there is some doubt as to whether or not the cardiorespiratory reserve is sufficient to carry the patient through the added strains of thoracoplasty. If, in spite of this, it is decided to proceed with the operation it should be a most definite warning that no extensive rib removal be attempted at any one stage. We have not found it necessary to forego this preliminary exercise in any cases except a very few who had severe repeated pulmonary hemorrhages, which were entirely uncontrollable by any means other than thoracoplasty.

We now see to it that the patient does not at any time suffer for the lack of sufficient fluids. Blood transfusions are occasionally given before operations and fairly frequently afterwards. If a transfusion is not given immediately after operation, 1000 c.c. of 5 per cent glucose solution is given routinely.

The application of a 10 per cent formalin solution to the periosteum of the upper ribs has been practiced for the past four years. We feel it has been of distinct value, especially in many of the poorer risk patients, in that it has permitted some increase in the time interval between stages. The condition of some was not sufficiently satisfactory to warrant proceeding with the next stage before the chest wall would have become fixed had formalin not been used. On the other hand, it is our opinion that we have at times used it too freely or too energetically since in a few patients it has almost entirely prevented the formation of new bone. The collapsed portion of the lung has partially re-expanded for lack of bony support and has reopened cavities which apparently had been closed.

The anesthetic employed in all cases was nitrous oxide and oxygen. In a few patients small amounts of ether were used in conjunction with the gas.

Operative fields are prepared with tincture of metaphen or tincture of mecrestin. Anterior stages or costectomies are done with infiltration anesthesia.

TABLE 1

Total number of patients, 112

	Number	Per Cent
Negative sputum or no expectoration.....	4	3.6
Positive sputum	108	96.4
Converted	81	75.
Unconverted	27	25.
Died	14	12.5

TABLE 2

62 women submitted to thoracoplasty

	Number	Per Cent
Negative sputum or no expectoration.....	3	4.8
Positive sputum	59	95.2
Converted	44	74.6
Unconverted	15	25.4
Died	9	14.5

TABLE 3

50 men submitted to thoracoplasty

	Number	Per Cent
Negative sputum or no expectoration.....	1	2.
Positive sputum	49	98.
Converted	12	24.5
Died	5	10.

I wish to report the result of 112 completed thoracoplasties since 1936.

Among the total group of unconverted sputum I have included 7 patients in the far advanced classification who underwent incomplete thoracoplasties. Also, the thoracoplasty patients listed as dead all had unconverted sputum, and were included in all the unconverted sputums in all the tables.

Total female thoracoplasty group, white and colored, which comprised 62 cases, is tabulated in Table 2.

Total male thoracoplasty group, white and colored, which comprised 50 patients are explained in table 3.

Total thoracoplasty patients classified as far advanced, 95. Many of these cases had enormous cavities, several extending as far down in the front as the upper border of the third rib. In this group are 26 cases, 28.3 per cent unconverted sputum, which make up the group of problem cases. In 70 to 80 per cent of the cases the operation is completed, the sputum negative, and after 1 or 2 years are well and able to return to a fairly normal life.

TABLE 4
95 Cases Classified as Far Advanced

	Number	Per Cent
Negative sputum or no expectoration.....	3	3.2
Positive sputum	92	96.8
Converted	66	71.7
Unconverted	26	28.3
Died	12	12.6

Female thoracoplasties classified as far advanced numbered 55 as compared with male thoracoplasty patients classified as far advanced, 40

TABLE 5
55 Women classified as far advanced

	Number	Per Cent
Negative sputum or no expectoration.....	2	3.6
Positive sputum	53	96.4
Converted	38	71.7
Unconverted	15	28.3
Died	9	16.4

TABLE 6
40 Male Thoracoplasty Patients Classified as Far Advanced

	Number	Per Cent
Negative sputum or no expectoration.....	1	2.5
Positive sputum	39	97.5
Converted	29	74.4
Unconverted	10	25.6
Died	3	7.5

Total thoracoplasties in moderately advanced group, 16, of which 6 were females and 10 males. See tables 8 and 9.

TABLE 7
16 Total thoracoplasties in moderately advanced group

	Number	Per Cent
Negative sputum or no expectoration.....	..	..
Positive sputum	16	100.
Converted	14	87.5
Unconverted	2	12.5
Died	2	12.5

TABLE 8
6 Female thoracoplasty patients classified as moderately advanced

	Number	Per Cent
Negative sputum or no expectoration .....	..	..
Positive sputum	6	100
Converted	6	100
Unconverted .....	..	..
Died .....	..	..

TABLE 10
Total of 112 Thoracoplasties
Age Group

Age Group	Total		Expectoration		Positive Sputum		Converted		Unconverted		Died	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
10-20.....	5	4.5	1	20	4	80	4	100	0	0	0	0
20-30.....	45	40.2	2	4.4	43	95.6	37	86.1	6	13.9	3	6.7
30-40.....	38	33.9	1	2.6	37	97.4	24	64.9	13	35.1	6	13.2
40-50.....	20	17.8	0	0	20	100	12	60	8	40	5	25
50-60.....	3	2.7	0	0	3	100	3	100	0	0	0	0
60-70.....	1	.9	0	0	1	100	1	100	0	0	0	0

TABLE 11
Types of Operation

	Total			Total			Moderately advanced			Far Advanced			Died	
	No.	%	Converted	No.	%	Unconverted	No.	%	Converted	No.	%	Unconverted	No.	%
Types of Operation	11	4	50										3	2
1st type: Rib resections only . . .														
2nd type: Resections of ribs and the transverse processes	72	54	75	18	25	11	84.6	2	15.4	43	72.9	16	27.1	9
3rd type: Transverse processes, tip of scapula and resections of ribs	7	6	85.7	1	14.3	..	..	..	..	5	83.3	1	16.7	1
4th type: Rib resections, transverse process and bony plate	5	4	80	1	20	..	..	..	..	4	80	1	20	..
5th type: Posterior and anterior rib resections and transverse process	14	12	85.7	2	14.3	2	100	..	..	10	83.3	2	16.7	..

TABLE 9

10 male thoracoplasty patients classified as moderately advanced

	Number	Per Cent
Negative sputum or no expectoration.....	10	100
Positive sputum	8	80
Converted	2	20
Unconverted	2	20
Died		

Of this group there were 14, or 12.5 per cent, primary operations. There were 98, or 87.5 per cent, secondary to one or more of other methods of collapse. There were 6 in this group, which are unsuccessful thoracoplasties and will necessitate further operative procedure for cure. There are 8 incomplete thoracoplasties—one physically unfit for further procedure, 2 patients were discharged from the sanatorium for disciplinary reasons. Three were allowed to go home to see if they could improve sufficiently to justify further operation. Two discontinued owing to their poor physical condition. Included in this group are a total of 16 negroes receiving thoracoplasties—11 females and 5 males. Sputum was converted in 11, or 68.8 per cent, unconverted in 5, or 31.2 per cent. There was one death. Six and three tenths per cent of this group died 11 days after the second stage from mediastinal flutter.

The outcome of thoracoplasty depends upon the operative risk involved. In the moderately advanced cases with small lesions where from five to seven ribs were removed the risk is relatively small, but where the cavities are large and the disease far advanced the risk is much greater.

We believe a good five or six rib thoracoplasty done early is more conservative than the continuance of any procedure or procedures, which allow the tuberculous lesions to advance.

TRAUMATIC AMPUTATION OF FINGER TIPS

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and

MILTON NEWMAN CAMP, CAPTAIN, M. C.

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TRAUMATIC amputation of the finger is not an infrequent accident in our highly mechanized army, but we desire now to deal with those amputations involving only the distal phalanx. The most common contributor to our series of these cases has been the tank. In riding over rough terrain a man inside a tank frequently has to brace himself by pushing against the sides with his hands and if he is unfortunate enough to thrust a finger through the crack of an insecurely fastened door or hatch, amputation may result. The majority of these cases have been amputations through the terminal tuft of the distal phalanx of the middle finger although amputations of all the various fingers including the thumb have been seen. In all cases with one exception, there has been only a single member involved. The finger is usually completely amputated but in the majority of the cases the base of the nail is not completely avulsed (fig. 1).

Roentgen examination commonly reveals a more or less horizontal, clean cut amputation through the terminal tuft of the distal phalanx. Occasionally more fragmentation or longitudinal splintering of the distal phalanx is observed (fig. 2).

Our procedure is, if possible, not to amputate these fingers through the distal interphalangeal joint, but, after debridement, the raw surface is usually grafted and the nail base preserved. The application of a split thickness skin graft is the procedure most often used.

All of the cases in which we have done a skin graft have been seen early, that is, in a maximum of three hours after the accident but in two cases the skin grafts were not actually performed until nine and fourteen days respectively following injury. These two exceptions were treated with continuous saline applications until healthy granulating tissue had appeared. When first seen by us, all of our cases but one had had a sterile dressing applied by a field surgeon and no antiseptics had been used. This exception was that of a soldier who had chopped his right index finger with an axe while away from camp on a furlough and was treated by a civilian doctor.

Our patients receive a sedative hypodermic and after roentgen examination to determine the amount and nature of bone involve-

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Fig. 1. Typical finger tip injury—caused by tank door. (Case not described in this series. At present, in hospital).



Fig. 2. Case 8.

TABLE NUMBER 1 SUMMARY OF TREATED CASES

Case No.	Age	Method of Injury	Finger Involved	Nail Bed Preserved	Distal Phalanx Involvement	Hospital Treatment	Interval Before Opr.	End Result	Post Opr.* Days in Hosp.	Comment
1	25	Tank door accident.	Middle, right	Yes	Terminal tuft	Reamputation at distal interphalangeal joint.	20 hours	Loss of distal phalanx.	3	Evacuated to Home Station. Further progress not known.
2	26	Cut with hatchet.	Index, right	No	Small stump of phalanx remained.	Reamputation at distal interphalangeal joint.	3½ hours	Loss of distal phalanx.	3	Evacuated to Home Station. Further progress not known.
3	19	Cut with edge of frying pan in a fight.	Index, right	Yes	Terminal tuft	Split graft	3 hours	Excellent	34	60% graft "take." No permanent disability.
4	25	Caught finger in a pulley.	Index, right	No	Small stump of phalanx remained.	Reamputation at distal interphalangeal joint.	6 hours	Loss of distal phalanx.	16	Small degree of permanent disability.
5	23	Mashed finger under gasoline can.	Index, left	No	Terminal tuft	Reamputation at distal interphalangeal joint.	3 hours	Loss of distal phalanx.	28	Small degree of permanent disability.
6	23	Cut finger with axe.	Index, right	No	Small stump of phalanx remained.	Reamputation at distal interphalangeal joint.	3 hours	Loss of distal phalanx.	27	Small degree of permanent disability.
7	19	Tank door accident.	Middle, right	Yes	None	Pinch graft	9 hours	Complete recovery.	22	Excellent graft "take."
8	28	Tank door accident.	Middle, right	Yes	Terminal tuft	Split graft	1 hour	Excellent	15	Excellent graft "take."

TERHUNE, CAMP: AMPUTATION OF FINGER TIPS 649

9	21	Caught finger in fan belt.	Ring, right	Yes	Terminal tuft	Split graft	2 hours	Excellent	32	No "take" of graft. Graft acted as eschar.
10	22	Tank door accident.	Middle, right	Yes	Terminal tuft	Pinch graft	14 days	Excellent	44	Only one pinch graft took.
11	23	Tank door accident.	Middle, right	Yes	Terminal tuft	Split graft	1½ hours	Excellent	47	No "take" of graft. Graft acted as eschar.
12	32	Tank door accident.	Middle & ring, left.	Yes	None	Pinch graft	1 hour	Satisfactory	16	Excellent "take" of grafts. No disability.
13	30	Caught finger in breech slot of gun.	Thumb, right	Yes	None	Split graft	3 hours	Too early to determine.	12	Graft appears viable.
14	26	Caught finger under ice box while unloading it from a truck.	Little, right	Yes	Terminal tuft	Sulfanilamide dressing.	½ hour	Too early to determine.	8	Not enough tip loss to warrant grafting.
15	24	Tank door accident.	Ring, right	Yes	Terminal tuft	Sulfanilamide dressing.	1 hour	Too early to determine.	Not hospitalized.	Not enough tip loss to warrant grafting.

* Soldiers as a rule are kept in hospital until complete recovery is obtained.

1. 80 per cent of cases had bone involvement.

2. 40 per cent of total cases involved the middle finger.

3. 87 per cent of the tank door injuries included involved the middle finger.

4. Average recovery time when finger amputated was 23½ days—(5 cases).

5. Average recovery time when injured finger treated with skin graft was 30 days—(8 cases).

ment, the injured hand is washed thoroughly with green soap and saline. Tincture of merthiolate or tincture of mercresin is applied to the hand and fingers, being careful not to get any of the antiseptic in the wound if skin graft is contemplated. Proper drapes are applied and the base of the involved finger is blocked off by means of local infiltration with 1 per cent procaine solution. A thorough wash-



Fig. 3. Cases 10, 11 and 12 (from right to left).

ing of the wound with green soap and saline is now repeated and no other antiseptic is put in the wound. Debridement of the injured tip is now done and bleeding controlled with hemostats and warm saline sponges. Persistent bleeders are tied with fine black silk. Loose fragments of the distal phalanx are removed and if the fat pad over the bony stump is considered insufficient, more of the remaining phalanx is resected with rongeurs.

While hemostasis is being completed an assistant obtains a circular, split thickness skin graft about the size of a twenty-five cent piece from one of the thighs under local 1 per cent procaine infiltration. Sulfanilamide powder is sifted on the finger stump and the graft is carefully applied over the treated raw surface. The edges of the graft are secured to the skin margins of the finger with No. 0 interrupted black silk sutures, using a small curved cutting needle. The graft is not sutured to the dorsal margin of the stump nor is any of the nail bed covered. A vaseline gauze strip is placed over the graft and skin margins with a firm pressure bandage applied over this.

The pinch graft cases were treated in a similar fashion except for the type of graft.

The wound dressing is not disturbed until the eighth postoperative day. At this time it is removed and the operative site cleansed with warm saline sponges. The sutures are removed if healing permits and light dressings are used until healing is complete.

We have used one of these methods (split thickness graft or pinch graft) on eight cases. The grafts have remained viable in six cases. In the two cases in which the graft was not viable at the time of the first postoperative dressing it was our opinion that the dead graft acted as a sort of eschar on the raw finger tip and that marginal skin growth covering over the raw surface under it was more rapid and accompanied by less infection than if not grafted. By the time the raw surface was healed the nail had grown to where it was a real protection to the finger tip (fig. 3).

All of the discharged patients were returned to duty with only a minimal amount of disability and capable in our opinion of performing the same duties as they were before the accident.

In our series five finger reamputations at the distal interphalangeal joint were done. This procedure was with one exception followed because the injury had occurred back of the nail bed and it was thought that sufficient bone and soft tissue was not present to warrant an attempt to preserve any of the distal phalanx. The exceptional case was not seen until 20 hours after the accident but we feel now that it might have been possible to have saved the tip by applying saline applications followed by a delayed skin graft.

We realize that our method of treating the above injuries presents nothing new but we feel that it is a treatment often omitted in favor of a mutilating re-amputation at or near the distal interphalangeal joint for the sake of immediate closure.

CONCLUSIONS

1. A permanent disability is often prevented in many cases of traumatic injury to a finger tip by not re-amputating at or near the distal interphalangeal joint.
2. The application of a split thickness skin graft to the raw surface of the amputated end of a finger is an excellent method of saving the distal phalangeal stump.

SURGICAL LESIONS OF THE COLON

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SURGICAL lesions of the colon consist primarily of benign tumors, amebic colitis with abscess, chronic ulcerative colitis, diverticulitis, and carcinoma. In any consideration of their surgical treatment, it must be borne in mind that the colon is in reality two separate organs, embryologically, anatomically and physiologically. The right half to the splenic flexure arises from the midgut. This half is the larger of the two; its walls are thin and permeable, and its function principally that of absorption. The left half arises from the hindgut; its walls are relatively thick and muscular, its function storage. In addition, the blood supply of the right half is derived chiefly from the superior mesenteric artery and its branches, whereas that of the left is received through the inferior mesenteric artery. These facts materially influence the choice of the operative procedure as it involves the various portions of the colon.

Despite the differences in the two halves, from the pathologic and clinical viewpoints, and to some extent from the surgical as well, all lesions of the colon, whether benign or malignant, have much in common. The simplest approach to the problem of treatment of individual lesions seems to be through a review of these common pathologic and clinical features; perhaps the points of distinction may then be more clearly defined.

For practical purposes, lesions of the colon may be regarded as of two types: infectious and obstructive. Pathologically, the infectious type is characterized by ulceration and necrosis of the bowel wall; the obstructive type by protuberant masses in the lumen, or constriction of the wall by fibrotic changes. In the advanced stage, infection and necrosis may be superimposed upon an obstructive lesion and, conversely, an infectious lesion may become obstructive, either chronically, by scar tissue formation and stenosis of the colon walls, or acutely, by inflammation and edema of the infected area.

CLINICAL PICTURE

Infectious lesions may be of the acute, fulminating type, in which the symptoms are unremitting and rapidly progressive, or they may be chronic. By far the majority are chronic, pursuing a course over a period of months or years, with exacerbations and remissions. Unless the disease is brought under control by medical management,

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the remissions become shorter and the exacerbations more prolonged and severe.

The early clinical manifestations of infectious lesions are loss of appetite, weight and strength, a sense of discomfort or an aching pain in the abdomen, with local or generalized tenderness, and usually functional disturbances, such as dyspepsia and borborygmus. In the later stages, the patient complains of profound exhaustion, nausea, vomiting, fever, constipation and diarrhea, perhaps with tenesmus and the passage of blood and mucus. Since the right colon is thin and permeable, an infectious process in this half is evidenced principally by signs of anemia and toxemia incident to absorption of toxins by the blood stream, whereas those on the left are characterized chiefly by disturbed bowel function. Lesions in the transverse segment may present symptoms and signs common to both the right and left portions.

The symptoms of *obstructive lesions* are usually constant, rather than remitting, though they may at times be more severe than at others. Unless situated at the flexures or the rectosigmoid juncture, however, an obstructive, like an infectious process, may be present for an indefinite period before seriously incapacitating the patient. Especially is this true of those involving the cecum and ascending colon, wherein the lumen is large and the intestinal contents liquid. Growths in this area, in fact, often attain quite large proportions before presenting symptoms.

The earliest manifestations of obstruction consist of mild abdominal discomfort or a sense of fullness, flatulence and borborygmus. Gradually, distention, an aching pain, nausea, vomiting, constipation or diarrhea, or both alternately, appear. Frequently, at some time during the course of the disease the patient discovers a mass in the abdomen.

A combination of the symptoms of obstruction and infection suggests a disease in which both these factors are active. In such cases, the symptoms of the primary lesion predominate.

If uninterrupted, the process, whether obstructive or infectious, may sooner or later give rise to perforation or acute obstruction. In many cases, especially the benign lesions, it is one of these complications which bring the patient to the surgeon.

Perforation of the colon may take place on the outer side, into the soft tissues, or into the peritoneal cavity. In the majority of extraperitoneal perforations the acute process subsides and the opening heals under medical treatment. In others, however, an abscess forms, requiring incision and drainage. Intraperitoneal perforations usually are followed by a generalized peritonitis,

though occasionally the infection becomes localized, also forming an abscess. Unless treated surgically, abscesses may rupture secondarily into the bladder or into some other portion of the intestine, or may penetrate the abdominal wall.

Acute obstruction may be produced by the sudden occlusion of a constricted lumen by inflammatory edema of the diseased area, or by intussusception of a protuberant growth. Occlusion of the lumen by edema usually takes place at the flexures, particularly of the left colon, whereas the cecum and ascending colon are most often the sites of obstruction by intussusception.

Not infrequently, these complications are precipitated by a purgative or an enema. One should be exceedingly cautious, therefore, about advising such measures when an ulcerative or obstructive lesion of the colon is suspected. Barium enemas, also, should be given with the utmost care. I have seen three fatalities following perforation produced by the too vigorous introduction of barium for roentgenographic purposes.

EXAMINATION

The examination should include, first of all, palpation of the abdomen for a mass and for evidence of obstruction; second, blood studies to determine the presence of anemia; and third, studies of the intestinal contents for blood and mucus. The nearer the diseased area to the anal outlet, the more likely is one to find bright blood and an excessive amount of mucus. Occasionally, an obstructive or perforating lesion in the right side may give rise to a slight bleeding, which is presented as melena in the stool. A search for parasites in the intestinal contents or rectal smears should also be a routine procedure.

When a lesion of the colon of any type is suspected, digital examination of the rectum, as well as proctoscopy and sigmoidoscopy, should be an invariable rule. If the lower colon is involved, one can thus ascertain the type of the lesion, its stage of development, and the degree of obstruction, if present.

For the diagnosis of lesions above the reach of the sigmoidoscope, the roentgenogram is indispensable. Barium should be given both orally and by enema, in order that the entire colon may be visualized.

SURGERY

Surgery of the colon consists, in the main, of incision and drainage of localized abscesses secondary to perforations, palliative colostomies, and partial or complete resection. The method of draining

abscesses is familiar to every surgeon, and palliative colostomies do not differ from those performed prior to resection. Only the technics of resection, therefore, will be described herein. Before going into this phase of the subject, however, each of the surgical lesions of the colon will be discussed separately and briefly; although the respective principles of the operative procedures are similar, regardless of the nature of the disease process, the indications for the one or the other vary according to the type of lesion.

AMEBIC COLITIS

Amebic colitis may involve any part of the colon or practically the entire organ. In the majority of cases, the infection originates in the cecum and thereafter rapidly extends distally. Discrete ulcerations of varying size, shape and depth, with hyperemia and edema of the bowel wall are the pathologic features of the disease. In the advanced stages, the ulcers present overhanging edges and contain mucus and necrotic material in which the vegetative amebae may be found in large numbers.

In virulent or untreated infections, the ulceration may go on to perforation, either into the extraperitoneal tissues, or into the peritoneal cavity; or, rarely, the bowel may be destroyed and replaced by scar tissue, resulting in stenosis and obstruction, or a tumor-like fibrous mass may form, with an ulcerated center, not unlike carcinoma. Cases have been reported, also, in which, following a prolonged amebic infestation, a diffuse polyposis of the colon was observed.

The differential diagnosis is often impossible by the symptoms alone, as almost any organic disorder may be suggested. One must rely upon the demonstration of *Endameba histolytica* in the stools or in rectal smears. The roentgenogram is useful for determining the extent of the pathologic process and for eliminating other disease conditions as diagnostic possibilities.

Surgical treatment is usually limited to incision and drainage of an abscess, following perforation of an amebic ulcer. If resection seems advisable, as may be true in the presence of multiple ulcers or stenosis, the two-stage procedure may be employed to advantage.

DIVERTICULITIS

Diverticulitis may involve any part of the colon, though in the majority of cases it is confined to the left half, and particularly the sigmoid. The inflammatory reaction is brought about by retention of the intestinal contents within the sacculations and superimposed

infection, and in some cases leads to necrosis and perforation. Obstruction is usually incident to an inflammatory edema and subsides with subsidence of the disease process.

The diagnosis should not be difficult, especially if a previous roentgenologic study has revealed the presence of diverticula. The picture is similar to that of appendicitis, though, as a rule, the symptoms are referable to the left rather than to the right side.

With few exceptions, surgery is limited to incision and drainage of abscesses secondary to perforation. In rare cases, resection is necessary for obstruction produced by stricture.

I have recently observed a most interesting case in which a diverticulum perforated into the peritoneal cavity. The perforation was precipitated by a purgative and was spread further two days later when the patient took an enema. At the time of his admission to the hospital, the process appeared to be localizing. Conservative treatment, including sulfanilamide, was therefore carried out for several days, until the localization was complete. The abdomen was then opened, the cavity evacuated, drains inserted and the wound closed, and a transverse colostomy established. At the end of two weeks, irrigations were instituted, and two weeks thereafter the patient was dismissed, to continue the irrigations at home.

The perforation persisted, and five months following the first operation the abdomen was explored, the patient in the meanwhile having been amply rehabilitated. The offending diverticulum was found at the mesenteric border in the midportion of the sigmoid, and a few other small diverticula, of no consequence, were scattered along the segment; it was thus definitely established that the process was inflammatory. By reason of these facts and the risk of resection, closure of the perforation was considered advisable. Accordingly, the fistulous tract was excised and the opening sutured with two rows of catgut and covered with fat. Before closure, sulfanilamide was poured into the peritoneal cavity and into the incision. Drainage was established through a stab wound to the right. Two weeks later, clamps were applied to the spur of the transverse colon, and ten days thereafter the colostomy was closed by the delayed method. Bowel function was reestablished within a few days, the wound healed by primary union, and the patient left the hospital in good condition two weeks following closure of the colostomy. Examinations have since shown the lumen of the colon to be ample throughout and function has remained satisfactory.

Two features of this case seem noteworthy: first, the perforation was precipitated by a purgative and spread further by an enema; and second, when the abdomen was explored, five months after the

original operation, the condition was found to have subsided sufficiently under conservative treatment to preclude the necessity for resection.

CHRONIC ULCERATIVE COLITIS

Chronic ulcerative colitis, or segmental colitis, is largely a disease of the left half of the colon, beginning, usually, in the anal region and extending orally; it may, however, begin in the cecum and extend distally, or in any segment and extend in both directions. The clinical course is variable, often covering a period of many years and being interspersed with more or less prolonged periods of freedom from symptoms.

In the late stages, the pathologic picture is that of a uniform thickening and fibrosis of the muscular coats of the bowel, with both longitudinal and transverse contracture and loss of the haustra, and pronounced irritability, hyperemia and edema of the lining membrane, with diffuse penetrating, exudative ulcers interspersed with scar tissue and frequently with multiple polyps. In the majority of cases, the colon is involved throughout, though not to the same degree in all segments. The diagnosis is confirmed by the roentgenogram, in which the colon resembles a rubber hose or lead pipe having a smooth exterior and a more or less narrowed and roughened canal. When the lesion involves the rectum, miliary ulcers and polyps may be seen through the proctoscope.

It is difficult to establish definite criteria for surgical intervention, one reason being the varied course of the disease. The necessity for prompt surgery in the acute fulminating type and in the presence of massive hemorrhage or other complications, is generally recognized. In the chronic, less complicated cases, however, we hesitate to advise operation, and the patient, in his aversion to colostomy and dread of colectomy, and in his hope of ultimate cure by medical means, is reluctant to undergo operation. In those cases wherein the disease tends to remission and the patient enjoys more or less prolonged periods of freedom from symptoms, there is good reason for postponing surgery. A continuation of symptoms, especially with exacerbations, certainly justifies operation. One of my patients with a rather severe form of the disease refused operation and succumbed within eighteen months from the onset, the immediate cause of death being rupture of the colon and generalized peritonitis. Another has been under medical treatment for eleven years, yet during this entire period has never been wholly free of symptoms. There is no doubt that the first of these patients should have been operated upon, and one may question whether extirpation of the diseased area of the colon of the second might not be better

than the prolonged suffering and annoyance, with the ever-present risk of an acute exacerbation and possible perforation, or the danger of other complications.

Treatment.—At operation, one often finds a colon in which one or more ulcers have penetrated the bowel completely, or the walls have become so necrotic that they rupture at the gentlest touch. Obviously, the operation in such cases presents almost insurmountable difficulties, and even though it is successfully consummated, the danger of postoperative complications, particularly from sepsis and continued hemorrhage, are yet to be reckoned with. It is not surprising, therefore, that, regardless of every precaution, the surgical mortality is high.

According to the experience of some surgeons, a short-circuiting operation, such as an ileotransverse colostomy or ileosigmoidostomy, is relatively safe and, in certain cases, justifiable. When the right half alone is involved, a two-stage resection may be carried out with little risk and satisfactory results. In the presence of an extensive infection, however, complete colectomy may be necessary.

BENIGN TUMORS

Benign tumors of the colon, whether adenomas, lipomas, myomas, fibromas or angiomas, become surgical when they have attained sufficient proportions to produce obstructive symptoms. Structurally, these tumors correspond to the layer of the bowel wall from which they spring. They may have a broad base, or may be attached by a pedicle; as a rule, they are somewhat globular in contour. Obstruction is brought about by occlusion of the lumen of the bowel by the growth, by intussusception, or both.

The symptoms are likely to continue for a number of years, with exacerbations at intervals, followed by sudden or gradual subsidence. Their variable character may be explained by the movement of the growth with peristalsis, or, in the presence of intussusception, acute obstruction and spontaneous reduction. If the tumor has become ulcerated, the symptoms of infection, possibly with hemorrhage, will be associated.

On palpation of the abdomen, the mass will be soft and movable, or, if low in the rectum, it may be palpated through the anus, seen through the proctoscope, or may prolapse externally. If too high for direct visualization, the diagnosis may usually be made by the roentgenogram. Should there be any difficulty in distinguishing the tumor from a carcinoma by the picture, its mobility and softness will indicate its benign nature.

At operation, the bowel should be searched and all growths re-

moved. Every tumor carries a threat, not only of intussusception, but of malignant degeneration. Especially is this true of adenomas. If intussusception has taken place, a tumor is generally found within or near the involuted portion. If not bound by adhesions, the intussusception may be reduced; otherwise, the entire mass should be

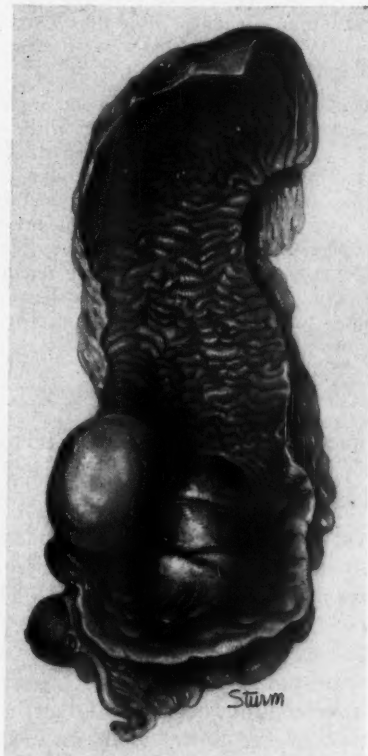


Fig. 1. Smooth, globular lipoma with superficial ulceration, springing from the submucosal layer into the lumen of the cecum, producing partial obstruction. The cylinder-like mass is an intussusception, passing the lipoma and completing the obstruction. Right colectomy was done in one stage, with good functional result. The patient is alive and well 5 years postoperatively.

resected, including the tumor and the surrounding inflamed area. Uncomplicated growths may be removed by simple excision; the opening in the bowel is then sutured and the abdomen closed without drainage. The latter procedure is especially suitable for polypoid tumors of moderate size.

A typical picture of a benign tumor is presented in the following case:

The patient, a woman 61 years of age, was brought to the hospital because of an acute epigastric pain. She gave a history of intermittent attacks of abdominal pain covering a period of two years. Recently, the pain had been more severe, especially after the ingestion of food, and had persisted longer than before. Nausea had accompanied each attack. She had lost several pounds in weight, and had also become aware of a mass in her right side.

Examination revealed a soft, movable mass in the right abdomen, with an area of tenderness on its outer side, and a mild degree of anemia. Otherwise, nothing of importance was found. The preoperative diagnosis was acute intestinal obstruction, probably from a tumor.

At operation, a soft, smooth, rounded, sessile lipoma larger than a hen's egg, with an area of ulceration over its apex, was found in the lumen of the colon, slightly distal to and partially obstructing the hepatic flexure. The bowel proximal to the tumor was intussuscepted, the ascending segment and a portion of the cecum being drawn into the transverse segment. The condition had existed sufficiently long to produce firm adhesions, preventing reduction of the intussusception and necessitating resection. A two-stage operation was done, the cecum, ascending colon and hepatic flexure being removed en masse at the second stage. The patient promptly recovered and bowel function returned to normal within a short time. The pathologist reported the tumor to be a lipoma arising from the submucosa (fig. 1).

CARCINOMA

Among the surgical lesions of the colon, carcinoma is chief in importance, not only because of its higher incidence, but also because its surgical aspects are far more serious than those of other diseases.

Pathologically, carcinomas of the colon are of two general types: one, the cellular, fungating tumor, which grows rapidly and protrudes into the lumen as a bulky, irregular mass. This lesion is often encountered in the cecum and occasionally in the rectum, developing, in many cases, from an adenomatous polyp. The other type is flat and annular in contour; its edges overhang and form a crater, which becomes ulcerated and necrotic. Growths of this variety spread by infiltration of the bowel wall, proceeding circumferentially and occluding the lumen by constriction. Usually, they have a fibrous or scirrhous base and are of relatively slow growth; the more fibrous the base, the slower the development. The scirrhous types are found most often in the left half, particularly from the splenic flexure to the rectosigmoid juncture.

Mucoid degeneration may be a feature of either the massive or constrictive types of carcinoma, and when present alters the picture to some extent. Tumors containing deposits of mucoid material widely infiltrate the bowel wall, but metastasize slowly. Once the regional lymph nodes are invaded, however, metastasis to distant areas quickly follows.

Clinical Picture.—The clinical manifestations of carcinoma do

not differ essentially from those of benign lesions of the colon. Malignancy should always be suspected, however, in the presence of a disturbed function, an alteration of the stool, a pain or a mass. Should anemia and evidence of toxicity dominate the picture, the

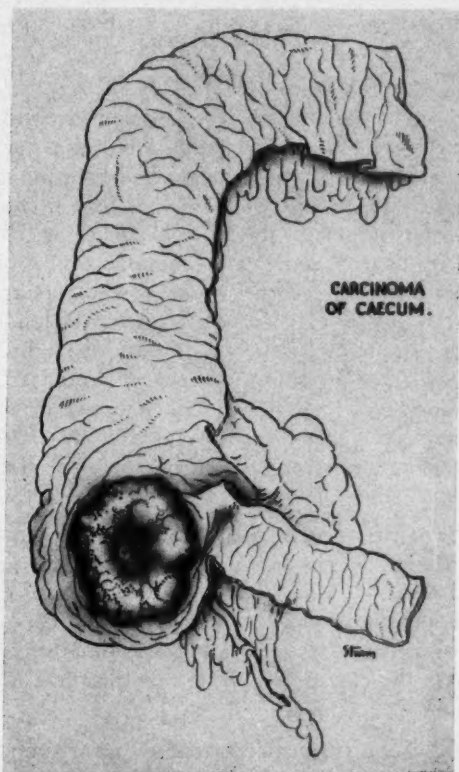


Fig. 2. Large, ulcerated carcinoma of cecum producing considerable pressure at the ileocecal junction, with partial obstruction. Operation consisted of an ileo-transverse colostomy, end to side, over a Furniss clamp, and right colectomy in one stage. The patient made a prompt recovery and has a good functional result, now two years postoperatively.

lesion probably will be on the right, whereas outstanding obstructive symptoms will suggest a growth in the left colon.

As a rule, it is not only advisable, but necessary to make use of every diagnostic measure, and occasionally even then one may be unable to determine the nature of the lesion until the abdomen is explored. Differentiation from other diseases of the gastrointestinal tract may present a number of difficulties. When the symptoms are referable to the right abdomen, one may also need to make a dis-

inction between carcinoma and appendiceal abscess. This point, however, may be clarified by failure to obtain a history of an acute attack of appendicitis and by the blood findings. Likewise, a chronic inflammatory appendix may become intussuscepted into the cecum, producing the classical picture of carcinoma. I have seen several examples of these conditions, in which the diagnosis could be made only by exploration.

Carcinomas of the rectum are often fairly well advanced before bringing themselves forcibly to the patient's attention. The usual history is that of an intractable constipation over a period of months or years, to which the patient has attached little or no significance, and subsequently a sense of heaviness in the rectum, which frequently is accompanied by attacks of diarrhea with tenesmus, but is unrelieved by evacuation. Most common and most conspicuous of all the manifestations of carcinoma of the rectum, and the one which brings the majority of patients to the physician, is the presence of blood in the stools. Usually the bleeding is slight, however, and for this reason the symptom is often attributed to hemorrhoids. Only rarely does cancer in this region produce acute hemorrhage. Pain is seldom experienced until metastases has taken place; it is then severe and radiates to the back or down the thighs, indicating pressure on the pelvic nerves by the tumor.

Rectal growths, obviously, are more easily recognized than those of any other region. If the tumor is low, the diagnosis may be made by digital examination. This procedure is also useful for determining the limits of local infiltration of the mass and the mobility of the rectum. In women patients, a vaginal examination will also enable one to estimate the extent of invasion of the rectal shelf and pelvic structures.

Treatment.—The surgical treatment of carcinoma of the colon is resection, when feasible. This includes excision of a wide area of the normal bowel both proximal and distal to the growth, as well as the neighboring gland-bearing tissue. Palliative surgery consists, in the main, of colostomy, to divert the fecal current, overcome obstruction and relieve irritation and infection. Occasionally, following this procedure the patient improves sufficiently to justify resection.

Prognosis.—The prognosis as to length of life depends upon the thoroughness with which the growth is removed. If metastases are present, the prognosis is governed largely by their extent and the degree of malignancy of the tumor. On the whole, cancers of the right colon are more amenable to complete resection than those of any other portion. Symptoms are experienced early and metas-

tasis takes place late, so that the growth has seldom extended beyond the local glands at the time of operation. The relationships to the other viscera in this section, moreover, make removal of the diseased area comparatively easy of execution.



Fig. 3. Adenocarcinoma of the ampulla of the rectum with glandular metastases, secondary to an adenomatous polyp. Two other polyps distal to the malignancy proved to be benign. Abdominoperineal resection done in one stage. The patient made a prompt recovery and is well eighteen months postoperatively.

The fact that carcinoma in the left half of the colon usually grows slowly is most advantageous from the standpoint of prognosis. Several months or a year, or even longer, may elapse before the entire muscularis is penetrated. If discovered before this time, the malignant tissue lends itself readily to complete eradication. Lesions at the splenic flexure and rectosigmoid juncture are more favorable for resection, as a rule, than those of any other portion of the distal colon, in that they make their presence known early. Unfortunately, because of the vague nature of their symptoms, rectal lesions

often metastasize to the glands and become fixed to adjacent tissues before discovery. In such cases, the technical difficulties of the operation are materially increased and the outlook is less promising.

RESECTION

Before being subjected to radical surgery, the patient should be thoroughly prepared by (1) infusions of glucose and saline and blood transfusions, to overcome dehydration, malnutrition and anemia, and other toxic effects of the lesion; (2) cleansing of the bowel by means of laxatives and enemas; (3) in the presence of obstruction, the use of the stomach tube; and (4) chemotherapy, in the form of one of the sulfonamide drugs, by mouth or otherwise. The only exceptions to this rule are those rare cases of acute obstruction and perforation, wherein operative intervention is urgent. *In all others, haste in resection of the colon is ill advised.*

The choice of the technic of resection should be governed by the extent and location of the lesion, the presence of obstruction, and the condition of the patient.

If the right colon is involved and is unobstructed, and the patient is a good surgical risk, one may excise the entire right half and restore the continuity of the bowel by anastomosis of the ileum to the side of the transverse or distal segments, in one stage. In the presence of extensive infection or obstruction, or if the patient is elderly or in poor condition, an ileocolostomy may be made as the first stage, to divert the fecal current, relieve the infection or obstruction, and enable the patient to withstand better the major operation. The anastomosis may be made end-to-side or side-to-side, as one desires. At the second stage, which is carried out through the same incision, the entire right half of the colon may be resected.

For lesions in the transverse colon without severe obstruction I prefer the Mikulicz operation, as a rule. An obstruction, however, calls for a preliminary cecostomy to permit decompression and irrigation of the bowel. Or, a primary cecostomy may be done, the diseased segment resected, and an end-to-end anastomosis made at a later date; after the continuity of the bowel has been reestablished, the cecostomy may be closed.

Resection of any part of the left colon should be carried out in two or more stages. In my opinion, one stage operations, with or without cecostomy, are exceedingly dangerous and should be avoided. The Mikulicz principle is also applicable to resections of the left colon, especially for lesions of the sigmoid sufficiently far above the rectosigmoid juncture to permit adequate elevation. In short, obese patients, these procedures may be difficult in that the sigmoid

and its mesentery are not of proper length. Pemberton, however, has suggested a modification whereby this difficulty may be obviated, namely, that the loop be elongated from below by splitting the peritoneum upward for several inches on both sides. The diseased segment is then drawn outside the peritoneum and fascia, these tissues sutured immediately about it, and the remaining portion of the wound left open and packed with gauze. Four or five days later, the loop of bowel is excised with the cautery and clamps applied to the spur. In many of his cases, the colostomy closes spontaneously, being already well below the surface.

In the presence of complete obstruction of the left half of the colon with extreme distention, the problem is more serious. It is in this group that the operative mortality is highest. One's first concern should be relief of the obstruction. Insofar as possible, this is accomplished prior to operation by the use of the indwelling stomach tube with the suction attachment, as suggested by Wangenstein. Generally, however, it is necessary to decompress the bowel by a cecostomy or transverse colostomy and carry out irrigations until all obstructive manifestations disappear and the patient's condition has improved. One may then investigate the cause of the obstruction through a midline incision and proceed with the type of resection which seems most appropriate; I employ resection with end-to-end anastomosis, or, preferably, the Mikulicz or one of the obstructive technics. The cecostomy is closed as the third stage of the operation.

It should be borne in mind that, when a cecostomy is done in these cases, no attempt should be made to explore the abdomen to determine the cause of the obstruction. The bowel might escape from the abdominal cavity and resist every effort at reduction, or one might produce a rupture or spread metastases or infection by even the gentlest handling.

When the extreme lower portion of the sigmoid, the rectosigmoid juncture, or the rectum itself is involved in the disease process, a combined abdominoperineal resection may be carried out. Early in my experience I employed a two-stage operation, first making a loop or single barrel colostomy, and later performing the resection. Also, on several occasions I followed a technic suggested by Lockhart-Mummery, wherein at the second stage the rectum, including the growth and gland-bearing area, was resected at some distance below the colostomy, thus leaving a blind segment of the bowel within the abdomen. Unquestionably, this procedure has merit. During the past few years, however, I have been using the one-stage resection in all cases except those wherein the patient is obese or very elderly, or in poor general condition. With the latter method

my mortality has been appreciably lower, and convalescence has been short and uneventful.

I wish to call special attention to two technical details which have materially reduced complications in my resections of the colon. The first of these is delayed closure of the colostomy wound. I have been using this procedure for the past ten years, but have never published it. Dr. Frederick Collier, however, at the meeting of the Southern Surgical Association in 1939, described a similar procedure and reported excellent results in primary healing. After freeing the bowel at the site of the colostomy, the colon is closed in its transverse diameter and sunk below the abdominal wall. Through and through sutures are then inserted into the edges of the incision, but left untied. The wound is packed with antiseptic gauze, and forty-eight hours later the pack is removed and the sutures tied, thus approximating the edges as a delayed closure. This is a modified drainage, yet primary healing almost invariably follows.

The second of these procedures is the local use of sulfonamide drugs. I have found that infection is minimized and healing facilitated by the introduction of sulfanilamide or sulfathiazol powder into both the peritoneal cavity and the incision, as well as into the posterior wound following abdominoperineal resections. No untoward effects have been observed from the use of 15 Gm. or more. Patients tolerate the drug remarkably well and the excellent post-operative course bears testimony to its efficacy.

Surgery of the colon has progressed a long way during the past few years. Surgeons have vied with one another in an effort to discover better technics, i.e., technics which were not only easier of execution, but which involved the smallest risk and the least morbidity, and at the same time gave the best functional results. They have, moreover, made use of every biochemical discovery, every therapeutic agent, which has seemed worth while. As a consequence, operations upon the colon are now widely accepted and, in the hands of good surgeons, the mortality is reasonably low. As the technic is further refined, as we understand more thoroughly all the numerous factors which influence the outcome, and as we are able to bring these patients to operation earlier when the indications for such treatment are clear, we may hope to elevate surgery of the colon to a standard comparable with that of other major procedures insofar as the risk is concerned.

CHEST INJURIES

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The increased pace in civilization, the increased and rapid construction work, due to war industries and the War itself, has caused and will cause a marked rise in the incidence of trauma, and has made the treatment of trauma one of the most important branches of surgery today. Injuries of the chest are on the increase, and this will continue as will also their severity until the end of the War. The majority of these injuries involve the chest wall, pleura or lungs, singly or in combination, and may be either unilateral or bilateral. The types of chest trauma usually encountered are contusions and crushing injuries caused by blows, falls and automobile accidents. The penetrating type are usually caused by knives, ice picks, bullet wounds and shell fragments.

Immediate collapse or sudden death may follow compression of the chest; this may be due to shock, vagosympathetic reflex, vascular paralysis, traumatic angina pectoris with acute cardiac insufficiency. In cases surviving the immediate effect of trauma, there is danger of massive intrathoracic hemorrhage, delayed rupture of the myocardium or great vessels, tension pneumothorax, massive collapse of the lung, emphysema of the mediastinum, extrapericardial and intrapericardial tamponade and the late hazards of infection; bronchopneumonia, traumatic pneumonitis, abscess, gangrene of the lung, empyema, and cellulitis of the mediastinum. The first examination of the patient with a chest injury should be gentle and as thorough as possible, avoid all unnecessary moving and shifting of the patient. An increasing hyperresonance indicative of tension pneumothorax or a mounting dullness suggestive of intrapleural fluid, should be promptly investigated. During the first 24 to 48 hours, the progress of intrathoracic changes can be more accurately observed, if the chest is not strapped with adhesive. Immobilization can be secured by applying a firm wide chest binder, which can be easily opened and closed without disturbing the patient.

X-ray examination is very valuable, but is not always conclusive in the initial stage of injury as to the nature or extent of the damage. X-rays taken in the upright position give the most information, but quite frequently the patient is in too much shock for this procedure. Shock is the first consideration in the treatment of these patients. The accepted methods of infusion, transfusion with whole blood or plasma, heat and oxygen may be used, however there is one exception, namely, that an individual whose vital capacity has been altered by an injury to the chest, will not tolerate the conventional

position which is commonly employed when shock is encountered. These patients must be allowed to sit up in order to breathe, and it is only safe after the chest is properly immobilized, or an existing pneumothorax or hemothorax, which may embarrass respiration is relieved that a recumbent position should be allowed.

The most common injury of the chest is fracture of one or more ribs. This injury is accompanied by excruciating pain, which may contribute to shock, and may mask less painful, but serious intrathoracic damage. The best way to relieve the pain is to strap the chest. This treatment is more effective when a wide band of adhesive is put completely around the body at the lower costal margin. When the fractures involve the upper ribs, an additional strip of adhesive may be carried over the chest, shoulder and back, in a "Sam Browne belt" effect. When the chest is properly immobilized, the amount of relief is often amazing, and a badly shocked patient may improve rapidly from this procedure. It is not necessary to determine the exact number or location of the rib fractures before treatment is instituted. We should not wait for x-ray confirmation of rib fractures before starting treatment, and often fractured ribs are difficult to show in an x-ray examination, all that is necessary to justify a diagnosis is a history of an injury to the chest and pain which is increased by respiration.

Fractures of the sternum are probably more common than we suspect. They are difficult to demonstrate with a conventional x-ray, and are of no particular importance unless the fracture is depressed and impinging on mediastinal structures. This type of fracture may interfere with respiratory and cardiac function. When this occurs, the sternum may be secured by towel clips or other suitable instruments and traction applied. The seriousness of a chest injury cannot be gauged by the apparent injury to the chest wall, but can only be estimated by determining the amount of damage which has been done to the underlying intrathoracic organs. The most serious and distressing of chest injuries are those with multiple rib fractures, or "stove-in chest" type, which result from extensive trauma, and are encountered frequently in automobile accidents. This condition requires careful immobilization of the chest wall, because there is a tendency for a portion of the thoracic cage between the fractures to become depressed during inspiration, and further embarrass breathing. A decision must be made concerning the amount of intrathoracic damage, and whether or not blood or air has escaped into the pleural space. A shift of the mediastinum can usually be detected by the position of the trachea, and the presence of fluid or air in the chest, made out by physical examination.

Traumatic pneumothorax may arise from a wound in the parietal

wall, in the lung or large bronchi. Pneumothorax from a small and promptly sealed wound, is slight and transient, and may go unrecognized, but if the wound in the wall bronchus or lung is large and remains patent, it comes on immediately and is extensive. It rapidly increases in valvular types of wounds and a tension pneumothorax may develop to a grave or fatal degree. Coughing, straining, excitement and forced breathing increase the degree of tension within the pleural space. In open pneumothorax (internal or external), air is forced through the wound into the pleural cavity during respiration. This suction acts with equal force on wounds and vessels within the lung and favors the continuance of hemorrhage, and is apt to dislodge blood clots that are formed and cause recurrent hemorrhage. Therapeutic pneumothorax eliminates the effect of suction, compresses wounds, vessels and bronchi, and prevents hemorrhage. It rests the lungs and promotes healing.

Tension pneumothorax may demand immediate treatment and all that is necessary for this is to insert a needle into the chest and withdraw a sufficient quantity of air to make a comfortable respiratory exchange possible. In cases where tension in the pleural cavity is high and continually forming, it will be necessary to insert an intercostal catheter into the chest and connect the tube to a water seal system, to maintain satisfactory relief of increased pressure, the tube should be removed as soon as air no longer escapes, and the chest wound tightly closed. If secondary infection should develop, it is better to postpone drainage to a later date.

Hemothorax is a sign of damage to the lung and pleura. Hemorrhage from rupture or laceration of the great vessels in the mediastinum or root of the lung, is immediate and massive. Slowly progressive or recurrent hemorrhage is increased by the excursions of the lung. Hemorrhage from the periphery of the lung is moderate or small, and may take hours or days before it becomes demonstrable. Adhesions of the lung to the chest wall increase the volume and duration of hemothorax and interfere with the control of bleeding by preventing collapse and compression of the lung. The volume of blood in a hemopneumothorax is in inverse ratio to the volume of air present. The blood in hemothorax clots slowly or not at all, clotting time is influenced by the rapidity of the bleeding, the slower the bleeding, the less likely is clotting to occur. The blood in a hemothorax may be partially absorbed early and this permits re-expansion of the lung, and recurrence of hemorrhage. Blood within the pleural cavity excites a reaction pleuritis with the formation of plastic exudate and adhesions. The treatment for hemothorax is a controversial subject. Some believe it is advisable to aspirate the blood from the chest immediately or soon after it is

discovered, others believe that it should remain in the chest and be absorbed. Emergency treatment for this condition should be conservative, except in cases of massive accumulations of blood producing serious pressure symptoms, in such cases, enough blood should be removed to relieve respiratory embarrassment. When this is done, part of the volume of blood removed should be replaced with air to secure and maintain collapse of the lung, as this compresses wounds, closes bleeding vessels and open bronchi, thereby preventing recurrent hemorrhage, infection from open bronchi and the formation of adhesions. Bleeding from the parietal wall, particularly the intercostal or internal mammary vessels, cannot be controlled by pneumothorax. Hemothorax should be sought for, not only in the injured, but in the contralateral side as well. This may occur from a sudden wrench or strain, which tears a vascular adhesion in the opposite pleural cavity.

Emphysema is quite common following chest injuries. It may be subcutaneous, subpleural or mediastinal; local, spreading or generalized. Localized, subcutaneous emphysema occurs in valvular wounds in the extrathoracic structures, the air being sucked in and spread by muscular contractions. Spreading emphysema may develop in open or closed wounds communicating with the pleural space and in punctured and lacerated wounds of the lung. It is more frequent and generalized in wounds of the lung and bronchi, which are held by adhesions in communication with the subcutaneous tissues, the overlying skin being intact. It usually develops promptly and spreads throughout the loose cellular tissues of the neck, face, trunk and extremities. Subcutaneous emphysema is not dangerous, but the underlying injury may be very serious. Mediastinal emphysema is most frequent in severe compression of the chest with no open external wound, it develops and spreads rapidly and may attain a high degree of tension. The symptoms depend on the amount of air accumulating in the mediastinum. There is progressive dyspnea, cyanosis, bilateral venous congestion in the lungs, dilatation of the veins in the neck and upper chest, circulatory failure and death. Physical signs first appear in the supraclavicular region and the base of the neck as a soft crackling swelling, which rapidly extends to the face and head, into the axilla, down the arms, chest and abdomen, there is tympany over the sternum and breath sounds are reduced. Heart dulness is obliterated and the sounds become fainter. X-ray films show mottled areas with vertical columns and decreased mediastinal density. The treatment is transverse incision over the supraclavicular space and the use of suction cups in an attempt to withdraw air from the mediastinum. If the condition is not promptly relieved, the mediastinum is opened parasternally. An effort may be made to close the defect in the bronchi. The op-

portunities in practice to employ radical surgical procedures in such cases are rare, however because of the present war, these severe injuries may be frequent enough to determine the advisability of surgical intervention.

Atelectasis is a common feature of chest injury, with or without penetration, and may resemble the postoperative form, the cause is not certain, but probably due to failure to cough up blood and secretion with the formation of a plug in the bronchus and rapid absorption of air distal to the block. The onset of this condition is recognized by sudden dyspnea, pain, a rising temperature and increased pulse rate.

PENETRATING WOUNDS OF THE CHEST

The treatment of these wounds is more difficult and far less satisfactory than in the case of non-penetrating wounds. Large defects in the thoracic wall must be immediately occluded and sealed. One may use a folded towel or cloth, rubber dam or a large moist gauze tampon, or pull the deflated lung into the wound and block the opening. This temporarily controls the sudden massive collapse, steadies the mediastinum and relieves cardiac and respiratory embarrassment that would be caused by a large sucking wound. Immediate operation should be done if possible under positive pressure anesthesia. The wound and pleura should be cleansed and debrided and fragments of ribs, clothing, blood clots and blood removed, bleeding vessels should be ligated and if possible the wound closed so that it is airtight.

Wounds of the heart occur in both penetrating and non-penetrating wounds of the chest. Laceration of the heart requires immediate operation and suture of the defect in the heart muscle, the majority of wounds are located in the right ventricle, because of its relationship to the anterior chest wall. These wounds are usually followed by rapid collapse and loss of consciousness, the signs are, the rapid fall in arterial blood pressure, an increase in venous pressure and absence or weak heart sounds. Under fluoroscopic examination there is an absence of normal excursion of the heart border.

Late complications of traumatic chest injuries are relatively rare. Empyema may follow hemothorax or pneumothorax, but this does not occur frequently and should be treated by drainage when frank pus has formed. Lung abscess may follow chest wounds, but are uncommon in both civil and war time injuries. It has been shown that only about 1.6 per cent of penetrating wounds of the lung resulted in pulmonary suppuration.

SUMMARY

1. Traumatic chest wounds are on the increase both in incidence and severity.
2. The patient should be carefully examined to determine the nature and extent of intrathoracic injury.
3. The treatment of injuries of the chest wall, pleura and lung is conservative, except for large and dirty, sucking wounds, bleeding from the internal mammary and intercostal arteries and persistent pulmonary hemorrhage.
4. All therapy should be directed toward restoring the normal anatomy, physiology and dynamics within the chest as soon as possible.
5. Immediate surgical repair is necessary for penetrating wounds of the chest.
6. Late complications are rare and should be taken care of as they arise.

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THE EDITOR TAKES LEAVE

More than two years ago I agreed to undertake, when called upon, certain duties even more important than those of editing THE SOUTHERN SURGEON. That time has come now so it is with regret that I must relinquish the helm.

When The Southeastern Surgical Congress was founded in 1930 the publication of a surgical journal representative of our section but national in scope, was one of its aims, an aim not possible of immediate accomplishment. In January, 1932, Dr. Beasley concluded that, although it would tax the finances of the young organization, the Congress could not afford to defer any longer its proposed journal. He asked me to prepare a *Bulletin* for February and March of that year to serve as a sort of trial balloon, and invited me (who paradoxically am not a surgeon) to attend the Assembly in Birmingham. The Fellows welcomed the idea of having their own journal and egged him on. During the meeting Dr. Willis Campbell spent a morning in his room at the Tutwiler giving me the benefit of his views as to what the journal should be. A few weeks later the Executive Council decided to launch a quarterly journal immediately, adopted the present name, told Dr. Beasley he must arrange the finances and appointed me Editor. (The only arguments we have ever had in these years have been when he couldn't see his way clear to pay for improvements I desired, one of the means he employed to keep the journal in the black). You are familiar with the subsequent history of THE SOUTHERN SURGEON.

This journal has been such an integral part of my life these ten and a half years that I feel that everyone who has contributed to its

growth, if only as a subscriber, is my personal friend. Certainly each succeeding President of the Congress has been most gracious to me, and it has been a privilege to know each one. It has been equally a privilege to get to know so many other surgeons of our section as well as those from other parts of North America, gentlemen who have added so materially to the success of our annual Assemblies as guest speakers.

It is impossible to name every man who has rendered signal service to *THE SOUTHERN SURGEON*. To begin with, each one of the Atlanta stalwarts has considered himself a godfather of the journal. Dr. Jeff Miller, perhaps the staunchest friend the Congress and its journal have ever had, made them recognized as Southern institutions. Dr. Matas, one of our most assiduous readers, has offered encouragement, and, in addition to frequent constructive criticisms, once gave advice of vital importance. Dr. Rankin, a frequent contributor and often a most helpful adviser, insisted that the journal must appear monthly. Dr. Sanders, during his term as President, however, secured the support of the Texas Surgical Society and thus converted the *SURGEON* into a monthly. He has not only written much for these pages but he has also secured perhaps more papers than any other one man. He has never been too busy to heed my calls for help. Sledding would have been truly tough at times in the last two years without his support. Dr. Abell, in spite of being Chairman of the National Medical Defense Council at the time he was President of the Congress, has never turned a deaf ear to requests for counsel. May I repeat that I am deeply grateful to everyone who has helped this journal along, though I can mention no more save my colleagues, Duffy Hancock, Walter Stuck and Earle Conwell.

I regret that *THE SOUTHERN SURGEON* has not yet fulfilled all the visions we entertained for it back in 1932, but it has had my best and I believe that all connected with it can be pardoned for a certain pride in what it has become: certainly it has never in any way lowered the dignity of the profession we love.

What the immediate future holds for *THE SOUTHERN SURGEON*—indeed what it holds for any of us—is uncertain. However, I hope that before many years there will be a knitting up of severed friendships and that there will dawn for this journal and for all of us a yet more glorious day.

—L. MINOR BLACKFORD

A BRIEF RESUME OF THE KENNY METHOD OF TREATING INFANTILE PARALYSIS

At this time I am not in position to reject or accept in its entirety the Kenny method of treating infantile paralysis. This presentation can be considered neither an endorsement nor a critical analysis of the method. We who deal almost entirely with the after-effects of this disease are anxious to find out all the good there is in such a method and employ it properly in the interest of the largest number of patients possible. When we, through constant study over a sufficient period of time, have obtained this information it is our aim to disseminate it to the medical profession through the proper channels. In the meantime, it is important to protect the public against any abuse or misuse of this method of treatment.

Miss Kenny claims to have proven that the clinical symptoms of infantile paralysis during the acute stage of the disease are exactly the opposite of those which we have been taught and have generally accepted as true. As an example, we have been taught that foot drop, a deformity which often follows an attack of infantile paralysis, is caused by a flaccid paralysis of the dorsiflexors or anterior group of muscles and that a fixed deformity with the foot in equinus is produced by shortening of the normal and uninvolved calf muscles whose action is unopposed. Ordinarily, we would apply a cast or drop foot splint to prevent the development of such a deformity. Miss Kenny claims that a fixed foot drop under these conditions is not caused by paralysis of the anterior group of muscles but by spasm of the posterior or calf group and that this calf group which is in spasm causes shortening of the posterior group. This shortening prevents the overstretched opposing group on the anterior aspect of the ankle from contracting physiologically. These anterior groups therefore have become mentally alienated. By "mental alienation" she means there has been a psychologic and not an organic interruption of the continuity of nerve impulses between the central nervous system and the skeletal muscles.

Her interpretation of the early clinical manifestations of the disease is based on four concepts. These are:

1. Pain.
2. Muscle spasm.
3. Mental alienation.
4. Muscle incoordination.

Her aims at treatment are:

1. To alleviate pain.
2. To abolish muscle spasm.

3. To substitute mental awareness for mental alienation.
4. Restoration of coordination of muscle activity.

Her methods of carrying out this treatment are, for the most part, diametrically opposed to those methods previously accepted. These methods are:

1. Abandonment of all splints, respirators and massage.
2. A natural rest position in bed with a foot board to preserve the standing reflex.
3. Hot fomentations to relieve pain and muscle spasm.
4. When spasm has been relieved a special analysis of the patient is made and a meticulous program of muscle reeducation is started. She employs:
5. Passive movements supplemented by active movements with attention directed at the insertion of muscles and tendons.

Her examination of the patient is done for the purposes of

- (1) determining which muscles are in spasm,
- (2) which muscles are alienated, and
- (3) which muscles are incoordinated.

A test of the degree of strength of individual muscles is not made and recorded as is done in the orthodox examinations.

In the past it was generally believed by the general practitioner, the pediatrician, and the neurologist that orthopedic attention should not necessarily be started until the quarantine period was over. The Kenny method of treatment stresses the importance of beginning hot fomentations just as soon as the diagnosis is made. It is claimed that in most instances all pain and spasm have been relieved by hot packs by the time the period of isolation ends.

The results of this type of treatment have so impressed a great number of responsible medical men that they have publicly announced that the method of treatment seems to offer more hope for recovery than anything that has been done in the past. They feel that

- (1) the patients have been more comfortable during convalescence;
- (2) there is no limitation of joint motion;
- (3) there are no contractures;
- (4) scoliosis and other gross deformities do not occur;
- (5) there are no undesirable visceral disturbances and kidney stone formation, and
- (6) the period of convalescence is materially shortened.

This is certainly an improvement in the condition of patients at the end of two or three weeks as compared to the condition of patients we have seen in the past who were treated by splints, particularly those distributed by the National Foundation. These splints often produced more deformities than they prevented. Fur-

thermore, I am quite sure that some of us in the past have all too often made a superficial examination of an infantile paralysis patient and simply telephoned the brace maker to go by the isolation ward and fit him with the necessary braces.

The acute cases we have had under our care have certainly been more comfortable. Patients who have come to us from other localities after having had this type of treatment from the onset have shown no limitation of joint motion, they have had no contractures, and their skin has been in an excellent state of nutrition. All of these patients, although in good condition, have not been entirely cured of their paralysis. For example, it has been necessary to fit some of these patients with long braces before they were able to walk.

I am still convinced that some patients will always show a residual muscle weakness and that the degree of this weakness will be determined by the extent and distribution of the destruction in the anterior horn cells. Likewise, I feel we will always have to have permanent apparatus for some of these individuals and that some type of surgery designed for rehabilitation will always be done, but it is my hope that this method will offer a means whereby the number of braces that will have to be worn will be lessened and that the number of operations that must necessarily be performed will be reduced to a minimum.

C. E. IRWIN, M. D.

*The outline of this presentation follows closely that presented by Dr. Philip Lewin, Illinois, M. J. April, 1942.

GRANTS FOR PHYSICAL THERAPY

Four additional grants totaling \$20,220.00 for the purpose of providing scholarships and training in the field of physical therapy—a field very important in the care of infantile paralysis—were announced today by Basil O'Connor, President of the National Foundation for Infantile Paralysis, Inc.

The list of awards, including the purposes, the institutions and the amount of each award, follows:

D. T. Watson School of Physiotherapy, \$4,500.00. Leetsdale, Pennsylvania. To provide training in physical therapy for additional students.

The American Physiotherapy Association, \$5,000.00. Stanford University, California. To provide fifty scholarships for properly qualified students in physical therapy.

School of Health, Stanford University, \$6,920.00. California. To provide training in physical therapy for additional students.

Northwestern University Medical School, \$3,800.00. Chicago, Illinois. To provide training in physical therapy for additional students.

Since last May, the National Foundation for Infantile Paralysis has awarded grants totaling \$347,564.25 to carry on its research and educational programs.

The National Foundation for Infantile Paralysis leads, directs and unifies the fight against infantile paralysis by means of its research, epidemic and educational programs. It also provides medical, nursing and hospital care and orthopedic appliances for needy victims of the disease through its more than 2,400 Chapters.

The funds which made possible the Foundation's programs are raised annually during the various celebrations of the President's birthday.

BOOK REVIEWS

The Editors of THE SOUTHERN SURGEON will at all times welcome new books in the field of surgery and will acknowledge their receipt in these pages. The Editors do not, however, agree to review all books that have been submitted without solicitation.

THE MANAGEMENT OF FRACTURES, DISLOCATIONS, AND SPRAINS, By JOHN ALBERT KEY, B.S., M.D., St. Louis, Clinical Professor of Orthopedic Surgery, Washington University School of Medicine; Associate Surgeon, Barnes, Children's, and Jewish Hospitals, and H. EARLE CONWELL, M.D., F.A.C.S., Birmingham, Consulting Orthopedic Surgeon to the Tennessee Coal, Iron and Railroad Company and the Orthopedic and Traumatic Services of the Employees' Hospital and to the American Cast Iron Pipe Company; Chairman of the Committee on Fractures and Traumatic Surgery of the American Academy of Orthopedic Surgeons. Member of the Fracture Committee of the American College of Surgeons. Associate Surgical Director of the Crippled Children's Hospital, Attending Orthopedic Surgeon to St. Vincent's Hospital, South Highlands Hospital, Hillman Hospital, Children's Hospital, Baptist Hospitals and Jefferson Hospital, Birmingham, Alabama. 1303 pages, with 1259 illustrations. Price \$12.50. Third Edition, St. Louis, The C. V. Mosby Company, 1942.

The sulfonamides have rendered texts more than five years old out of date: of no subject is this more true than of orthopedics. One welcomes all the more then an up to date version of the twice tested and widely popular Key and Conwell. It must be emphasized that, in the extensive revision that has been made, the sterling qualities of earlier editions have not been lost. It is still simply and clearly written; it still describes procedures that can be done by the average well-trained surgeons, it still demands only a minimum of apparatus and it gives instructions for improvising much of that. It need hardly be added that never before has such a book been more sorely needed.

As in earlier editions, the first section is devoted to general considerations. One notes the authors are not enthusiastic about reductions under the fluoroscope and give good reasons for their opinion; they "wish to emphasize the fact that the successful treatment of fractures is dependent upon the ability of the surgeon and not upon the method which he uses." The discussion of immobilization is excellent: it bears little resemblance to the subject as presented twenty-five years ago. The reviewer likes the pages on physical therapy too: they think it has been rather overdone; they take issue with Championnere and say "The first dictum of the physical therapist should be 'to do no harm.'"

The chapter on Compound Fractures and War Wounds is A-1. They emphasize the distinction between contamination and infection. The authors "believe that if shock is at all serious this should receive first attention and the delay of an hour or a few hours in treating the injury will not greatly enhance the danger of infection. This is particularly true since we have available the sulfonamide drugs. . . . The skin, not the wound, is then painted with a skin antiseptic," is a sentence worth remembering. They like a mixture of equal parts of sulfanilamide and sulfathiazole to sprinkle in the wound. In most instances five to ten grams is sufficient, but fifteen or twenty grams can be used without causing toxic symptoms. "If the sterile powder is not available we do not hesitate to implant the unsterilized powder in a compound fracture wound." The use of germicidin or penicillin in the treatment of war wounds in conjunction with or as a substitute for the sulfonamides is mentioned. They like to close the wound and to leave the cast undisturbed for three weeks. The

part dealing with War Wounds includes many photographs from the Surgeon General's Office and seems to be in accord with the latest military teachings.

There is a prediction of the replacement of ether by intravenous anesthesia in military hospitals during the war. The agents for intravenous anesthesia are more conservative of weight and space, produce their effects upon the patient almost immediately, and are safe when used by a properly trained anesthetist.

The chapter on Fractures of the Skull and Brain Trauma, originally prepared by the late Dr. Charles E. Dowman, has been brought up to date by his successor Edgar F. Fincher. Sentences, paragraphs and even pages appear just as they were in the original edition. However, sketches and x-ray plates have been added and medical treatment has been altered in keeping with the advances made in chemotherapy and in the treatment of shock. This reviewer does not believe that this section could be better done today.

James Barrett Brown is another contributor with a chapter on Fractures of the Jaws and Related Bones of the Face. He has made extensive revisions and added the latest technics, including the use of a pin through the fractured jaw. He has also added a number of new illustrations.

The excellent chapter on the spine has been improved by the addition of ten pages on the intervertebral disc and the ligamentum flavum. They remark that the neurosurgeon is more apt to diagnose these conditions than the orthopedist, perhaps sometimes too often. The reviewer has finally found something that he disagrees with: he prefers the injection of air rather than of an opaque oil.

One regrets that the whole book cannot be reviewed in detail. The section on the shoulder has undergone extensive revision. The hanging cast for fractures of the humerus has been added with a good discussion. The time honored belief that Volkmann's ischemic contracture is due to the pressure from splints has been relegated to medical mythology; it is secondary to occlusion of the venous return without affection of the arterial blood supply to the part involved. It should be watched for in unsplinted cases.

At the time of the first edition nailing the neck of the femur together was hardly beyond the experimental stage. This present presentation of the subject is mature and well rounded. There have also been additions to the section on injuries of the foot and ankle.

This book was originally "written for the student, the general practitioner and the surgeon," and of its third edition, one might add "for the military and the industrial surgeon." The student enjoys a complete book with explanations and ideas within his comprehension: it is no wonder then that most of the medical schools in the country use this book either as a text or for reference. The general practitioner likes a handy reference book and the surgeon, whether his work takes him into the armed forces or among the rapidly growing industrial war workers, or whether it keeps him at home, needs such a book.

It is not surprising to learn from the publisher that the third edition, hardly a month off the presses, is selling like hot cakes.

THE SURGERY OF PANCREATIC TUMORS. By ALEXANDER BRUNSCHWIG, M.S., M.D., F.A.C.S., Professor of Surgery, University of Chicago. Illustrated by Gladys McHugh. 421 pages, with 123 text illustrations and one color plate. Price, \$7.50. St. Louis: The C. V. Mosby Company, 1942.

A bare twenty years ago when we first began the study of surgery the only thing that was taught us about the pancreas was that acute pancreatitis was a surgical emergency: if recognized promptly (which it usually wasn't) and drained immediately the patient might survive after a stormy convalescence. Oh yes, we did hear too that the jaundice secondary to carcinoma of the head of the pancreas could sometimes be palliated by cholecystgastrostomy—if the patient happened to have a normal gallbladder. And here comes a whole book on surgery of the pancreas!

In the preface the author states that a medical treatise may be prepared as a review of a large field; or it may, in dealing with subjects still sub judice, afford the author a chance to air his own opinions. Or, thirdly, it may "deal with relatively few facts in a newly developing field and serve to stimulate further work in this field." It was in such a spirit that Dr. Brunschwig prepared this book. It summarizes "most of the recorded experiences in the surgery of all types of pancreatic tumors." Special acknowledgment is made to Whipple.

The first chapter is historical. It is not the least interesting. One hesitates whether to attribute the modern surgical interest in the pancreas to W. J. Mayo's exploration of a malignant islet cell tumor in 1926, reported by Wilder and others the following year with proof that the tumor and its metastatic nodules were producing insulin, or perhaps to Brunschwig's "first successful resection of the entire cancerous head of the pancreas with practically the entire duodenum."

The second chapter deals with the anatomy and embryology of the pancreas, the third with its physiology. It is surprising how much good solid material the latter contains and there will be few who, if they ever knew everything contained in it, have not forgotten a fair amount of it. After a brief discussion of the diagnostic procedures, care of the patient before and after operation is outlined.

A great deal of space is devoted to pancreatic cysts. The subject is logically and well covered.

Benign tumors of the ampulla of Vater are rare. Carcinoma in this region is much commoner. It is not often diagnosed and ends fatally in a few months if not resected. The discussion of the surgical treatment of it is fine.

Solid benign tumors (excluding those of the islands) of the pancreas are also rare.

The statistics from 5,200 consecutive necropsies at the University of Chicago show that cancer of the pancreas was the cause of death in 55 cases, an incidence of 1.05 per cent of the series. In the same series there were 203 cancers of the stomach, 165 of the colon and rectum, 138 brain tumors, 108 cancers of the lung, only 77 of the breast, 59 of the prostate and 58 of the esophagus. In this group, as well as in others, the head is the most frequent site of cancers arising in this organ. The general discussion cannot be epitomized here. Suffice it that jaundice is not invariable, and that, contrary to the older teaching, pain is often the initial symptom, frequently the outstanding symptom and, although it may vary to some extent in severity, it is per-

sistent. Palliative operations are described, but the greater interest lies in those designed to cure. Surgical cure has been effected a number of times now, so it is well worth the attempt. The technical procedures are well described.

Cancer of the body and tail is subject of particular interest to the reviewer, who has had the misfortune to see three such cases: one was diagnosed clinically and verified at autopsy; in two the diagnosis was made at exploratory laparotomy but the condition was inoperable. These cases impressed upon him, as is emphasized in this book, that "pain is the most outstanding and constant symptom . . . and in most instances the initial symptom." If the diagnosis is considered, it should be possible rapidly to increase the number of surgical cures.

Spontaneous hyperinsulinism was first described by Seale Harris in 1924, but the pathology was not elucidated for another three years. Recently Whipple has collected from the literature, personal experience and personal communications to him, a total of 134 cases of islet cell tumor, 29 of which had not been operated on. "It is amazing," as the author says, "that a clinicopathologic entity characterized by such striking symptoms and in most cases obvious pathology in the pancreas should have remained unknown until 1927." The chapters devoted to this subject are perhaps the most important in the book.

This scholarly monograph is clearly written and beautifully illustrated. In short, it is one of the most stimulating and valuable books of recent years.

AMBASSADORS IN WHITE. *The Story of American Tropical Medicine.* By CHARLES MORROW WILSON. 372 pages. Price, \$3.50. New York: Henry Holt and Company, 1942.

The perusal of this book has been one of the most delightful episodes in this reviewer's career.

The first chapter gives the author's thesis: South of the Rio Grande are almost as many souls as inhabit the United States, but "at this very moment it is a good bet that at least fifty million of them are sick. Sick of everything from sprue to leprosy. Sick of almost all the diseases that we in the United States encounter in our own lives, and of a multitude of savage and highly fatal diseases about which we know almost nothing." One of the most important causes of this is the poverty of the people. This is paradoxical because so much food can be raised down there with little effort. It is estimated that the spending of \$3.00 per capita annually for ten years on public health could make Central and South America as healthy as North America now is. Their ability to spend this money depends to a large extent upon us. Most of all it depends upon trade with the United States. "Better business in and with South America means better health throughout the Western Hemisphere. And better health means better opportunity and greater ability to foster and develop the ideas and ideals in defense of which the nations of the Western Hemisphere are now banded together."

In the second chapter we are surprised at some facts in the medical history of Latin America. In 1538 on the island of Santo Domingo, the University of Santo Tomas had begun teaching medicine. By 1580, twenty-seven years before John Harvard was born, the University of Mexico, founded in 1553, had a chair of medicine. The *Mercurio Volante*, founded in Mexico City in 1773, was probably the first medical journal of the Western Hemisphere.

"For half a century, at least, German business houses have made a point of studying and contributing to the study of Latin-American disease. And not

for philanthropic reasons, in most cases. For the same half century, German firms have been the leading peddlers of medicine, good and bad, to the people of South and Central America. German manufacturers are largely responsible for making these regions a salesman's paradise for proprietary medicines, quack remedies, nostrums, and bogus cures for everything from housemaid's knee to heart disease. In the course of accomplishing this end the Germans took pains to capture Latin-American markets for legitimate medicines and pharmaceuticals. Even during the war years of 1939, 1940, and 1941 the German position has been maintained.

"Actually the Nazis have been making use of their drug trade with South America to provide a source of revenue for propaganda and fifth column activity. They have found it possible to do this because of the great value and slight bulk of most essential pharmaceuticals, making such products extremely likely subjects for smuggling. Some drugs have been shipped on vessels which have run the British blockade but still more have been flown in on planes of a commercial Italian line, which until very recently maintained scheduled service between bases in West Africa and Natal, Brazil. It is possible for one large transport to carry more than \$250,000 worth of drugs."

Cuba's great medical hero, Carlos Finlay, is the subject of one chapter. Unlike ourselves, the Latin American countries do have judgment enough to make national heroes of their truly great physicians. In this country a true mead of recognition has never been granted Finlay; indeed the *Encyclopaedia Britannica* contents itself with but a single line in the article on preventive medicine.

"In 1882 Carlos Finlay implicated the responsible mosquito."

If it had not been for Dr. Matas, one fears that many of us would never have heard of him. The reviewer gains the impression that the chief reason Finlay's ideas did not attract more attention was his speech difficulty. One might almost conclude that a course in public speaking is an integral part of the education of an ambitious doctor.

After such encomiums had been heaped on the Cuban, the reviewer was afraid that the author might belittle his hero, Walter Reed of Virginia. His fears were entirely groundless; there was plenty of glory to go around. Reed's story still merits that overworked word thrilling. Gorgas of Alabama receives another biographical chapter, but he is already better known. Deeks of Canada provides an interesting chapter. And then Noguchi of Japan. At a time like this it is well to be reminded that Japan has given the world one respectable man, indeed one great man. It is also well to be reminded that our belief of forty years that yellow fever was a thing of the past is not well founded.

The balance of the book might be considered an introduction, if an elementary one, to tropical medicine—a subject that many of us must learn much about before long. The book in spots suffers from journalese and in spots could have been improved with a little medical editing. On the other hand it is a fascinating book and one that deserves a wide circulation.



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